



JOURNAL
OF
THE MILITARY SERVICE INSTITUTION
OF THE
UNITED STATES.

VOL. VIII.

DECEMBER, 1887.

NO. XXXII.

THE ARTILLERY AND THE ORDNANCE.

BY CHARLES F. BENJAMIN, LL.M.

THE recent article by Professor Michie on the personnel of the Artillery* is the most authoritative, and possibly the most authentic statement of the condition and tendency of that arm that has yet appeared. If the facts are as represented by the Professor, measures of amelioration ought to be devised with as little delay as possible, whether or not the causes have been accurately discerned or the best remedy proposed by him.

If one might presume to restate in a summary way the conclusions of the learned author, they could be read as follows: In certain grades of the Artillery the officers grow superannuated through the slowness of promotion; there is a lack of professional instruction and a want of proper *matériel* therefor; and, by reason of these defects, the whole body is becoming inert and morose in character and disposition—the more energetic or restless members seeking relief by transfer, or by retirement from the Service. The causes of this evil state are believed by the Professor to lie in a defective organization of the arm, and a faulty system of administration, and the remedy he would apply is the conversion

* JOURNAL OF THE MILITARY SERVICE INSTITUTION. Vol. VIII. No. 29.

of the Artillery into a scientific corps, with an organization akin to that of the Corps of Engineers. The proposal is not new, but it has the merit of coming from a source that must, in justice, be regarded as authoritative, and one that all know to be completely disinterested and free from bias. When such a voice as that we have heard proclaims that the state of the Artillery is a "menacing public danger," there is but one alternative—refute the prophecy or heed it. As preliminary to either course, its bases should be examined.

SLOWNESS OF PROMOTION.

There are two sides to this subject, the question of justice to individuals and the question of the public interest. Military policy, long and universally settled, requires that the holder of a military commission should progressively rise in rank, duty and emolument as his years of service lengthen. If there is anything unsound or empirical in this principle it has not been proved nor even suggested; therefore, for the purposes of this article, it will be taken as axiomatic.

Field officers and second lieutenants of artillery have no cause of complaint under this head, either absolutely, or by relation to their brethren of the two other arms. We have to deal only with the captains and first lieutenants. Upon present calculations, it takes a captain of Artillery close upon twenty years to gain his step, and this, to many, means retirement in that grade. First lieutenants may expect to wait about seventeen years each for their captaincies. No army worth its maintenance has legitimate use for majors far past sixty, or captains who are already forty-five to forty-seven years old when they come into charge of their batteries.

Artillery officers, as a class, are better sheltered, better fed and less exposed to injury and hardship than those of the cavalry or infantry; consequently they live and last longer, and get more out of life than the others. This, in a limited degree, compensates them for their slower promotion; but it does not alter the question of efficiency when the public interest is considered. Their superior comfort and security arise from a public exigency and not upon grounds of personal favor. Our peace establishment henceforth is to be the nucleus of our warlike strength in a much greater degree than at any time hitherto; indeed, it is not too much to say that, heretofore, those upon whose will and judgment the

existence of a standing army depends have primarily regarded the wants of a great frontier beset by martial savages, and only incidentally concerned themselves with the civilized uses of such an establishment. For the future, however, the needs of civilization are to have the first, and eventually the sole, place, and the smaller the forces maintained the greater the necessity that their organization, composition and equipment should be of the best, at any time and for all time. To disband the Army would be logical, if risky; to keep but a small army on foot would consist with the national character and circumstances; to keep up an army at once small and inefficient would be extravagant and foolish altogether.

Granted, then, that our captains of sixty and over, and our lieutenants of forty-five must "go," the question is, by what means they are to be made to disappear. One perfectly reasonable measure would be to increase the number of field officers for the light batteries, so as to allow a major for every two batteries and a lieutenant-colonel for every four. That this would not be an excessive establishment, either for instruction or for actual service, experience and argument will prove to anybody who will take the pains to make even a cursory examination of the subject. For the foot-artillery, the present establishment of one major to every four batteries, and one lieutenant-colonel to every twelve is enough; though if the present regimental organization should be altered, there would be some inducement to allow a lieutenant-colonel to every two, instead of every three battalions, as now; but this would be out of abundance of caution rather than proved necessity.

Another measure would be to graduate the age for compulsory retirement according to the rank of the superannuated officer. We ought not to have captains on the active list beyond fifty, nor majors beyond fifty-five, nor lieutenant-colonels beyond sixty. It is doubtful if they should be permitted to linger so long; but we must keep within the bounds of what Congress would be likely to deem reasonable in the public interest.

A fourth measure would be to require a substantial pass-examination of every officer, below field rank, coming up for promotion.

Lastly, a year's full pay should be allowed to every active officer retiring wholly and honorably from the Service in time of Peace. His place can always be adequately supplied, and he

would pass, for all practical purposes, into a reserve of officers, costing nothing more than their resignation pay, and gratuitously spreading wholesome military information and influences among the civic community. This feature should be as distinctive a part of the military system as any designed to affect officers in active service.

No suggestion is intended to be made for an increase in the number of colonels. In so far as they are specially anything, their functions are administrative.

It may be suggested here that if the foregoing scheme for a re-arrangement of grades should be adopted, it would be necessary to increase the light batteries from ten to twelve in number—a measure good and moderate in itself—and to take them all from one and the same regiment, thus converting one entire regiment into light artillery; an arrangement preferable, perhaps, to detaching two batteries from each of the five regiments, and thus maiming the tactical formation of the foot-artillery.

LACK OF PROFESSIONAL INSTRUCTION.

If this charge be true, it is more of an impeachment of the military hierarchy at Washington than of the military legislation; for the law nowhere forbids or supersedes instruction, and it certainly provides for it in, at least, a moderate measure. Instruction is theoretical and practical. To impart the first kind, the Artillery School was re-established soon after the late War, and has been maintained ever since. Professor Michie has intimated that the name is a misnomer. Let us see about that. The Secretary of War, addressing the President on the 30th of November last, states:

"The reports of the commanding officers of the Artillery School and the Infantry and Cavalry School are very satisfactory, and show that a high standard of *military* education has been established."

The Lieutenant-General, addressing the Secretary of War on the 10th of October last, says:

"The reports of the * * * commanding officer of the Artillery School * * * show the constant care that is being exercised for the maintenance of a high standard of *military* education."

The Commandant of the Artillery School, addressing the Adjutant-General on the 13th of September last, states:

"The primary object of the school is *not merely to educate lieutenants* to be lieutenants, but to prepare them for the responsible duties of *higher positions and commands*, especially in the field during War. The course of studies is therefore laid out to this end, and may fairly be considered as *post-graduate to the Military Academy*."

In proof of this statement is the following list of studies and exercises: Operations of War, Art of War, Troops in Battle, Infantry Battle Tactics, Illustrative Campaigns, Military Geography, Military Policy and Institutions, Ancient and Modern Armies, Constitutional, International and Military Law, Electricity, Photography, Signaling, Telegraphy, Engineering, Infantry Exercises, Ballistics, High Explosives, Artillery Exercises.

Professor Michie is right; the Artillery School is not a school of artillery, but an annex to the Military Academy for the general purposes of the Army. The artillery forces, like the "Seven Poor Travellers" of Dickens, have been elbowed out of their own quarters, and have had allotted to them the Irish co-heir's portion, "the outside of the house."

Practical instruction for the Artillery would consist in the drills and maneuvers pertaining to field, siege and sea-coast guns, but the foot-artillery are armed, equipped and drilled as infantry, and are competing for the Nevada Trophy by making bull's-eyes with the Springfield rifle. General Howard virtually says, in his last annual report, that they are not allowed sufficient ammunition for artillery practice. As to the light batteries, General Schofield says that they are too scattered to be efficiently instructed. Why should they be scattered? The cavalry and infantry are numerous and efficient enough to meet every demand of current service; the light artillery are useless for anything but instruction batteries, and are priceless in that character; yet they seem to be spread about, without necessity or employment.

The last annual report of the Adjutant-General shows that the fifty-five light- and foot-batteries not learning to be generals, lawyers, statesmen and scientists at the Fort Monroe Annex, were distributed at twenty-seven stations, and that at twenty-three of those stations they were only numerous enough to be caretakers of the public property, an office that might be as well discharged by an ordnance-sergeant, or a fort-keeper, armed with the majesty of the law and a pocket revolver. No reason displays itself why those twenty-seven stations should not shrink in number and grow in size till the artillery microcosms are compacted into administrative and tactical units. Are appropriations needed for enlargement of the selected posts? Tell Congress why they are necessary, and show, likewise, the economy of future maintenance and supply, and "streams of revenue" will "gush forth." Is it hoped to raise the Army to thirty thousand men by so scat-

tering the present force that it is inadequate for the daily routine of garrison? That were neither frank nor wise, and if successful to-day would be revoked to-morrow, to the confusion and dismay of the Service. Is there a fear that if Congress should be reminded that we have more troops than are needed for daily duty, there would be a raid on the Army? That were unjustifiable for no conceivable reduction would carry the Army below the number of twenty thousand men, re-established upon a more liberal and efficient foundation; while, on the other hand, such is the impression made upon our people (peaceable though they be in temperament, and secure as they feel in their numbers, talents and resources) by the swiftness, power and destructiveness of modern armaments, and the complexity and technicality of the present machinery of War, that a moderate increase, to complete the ideal organization of companies and regiments, is more probable than the smallest decrease.

To sum up this part of the subject, it is apparent that the Artillery does lack professional instruction, and that the immediate policy and duty of artillery officers are to temporarily lay aside all other grievances and longings, and, with a single voice, to petition the wavering or inattentive authorities at Washington for a restoration of the Artillery School to its proper uses, and a concentration of the whole Artillery at suitable posts for professional instruction.

WANT OF MATERIEL OF INSTRUCTION.

Our artillery officers crave breech-loading field, siege and garrison guns, but the types of those guns are all in transition, and it cannot yet be stated, with reasonable certainty, what ought to be the approved standards and models for even ten years ahead. The snarling and enfolded nations of Europe, forever on the edge of anxiety, are incessantly arming and re-arming themselves upon makeshift principles, but we should be blind to the advantages of our position and policy to follow their enforced example. No power on earth is going to assail us unless the provocation moves from ourselves, and are we to insure against national wickedness or folly on our own part? We are not actually defenseless; we can wait, as we have always waited, and, in the season of fruition, reap without planting, as we have done before. Why are we building cruisers, with the moral certainty that, before completion, their single screws, triple-expansion engines, and even

parts of their armament will be antiquated? Simply because we have worn our wooden ships to shreds, and must have something to keep up naval routine while the new types of vessels, motive-power and armament are perfecting themselves at the cost of peoples less fortunate than ourselves. So in the Army, we are "sampling" the "new styles" in ordnance, but not "laying in stock" while fashion is coquetting first with one pattern and then another, and is not dying for either.

But if we had experimental ordnance in plenty, the Artillery could not materially profit thereby. The batteries cannot drill at their present stations; they are but poorly practiced in those elementary maneuvers for which the present ordnance is sufficient; the technical school is out of joint. The *personnel* must get itself ready for the new guns before crying aloud for them, as it is now doing—but in the wilderness.

BAD ORGANIZATION OF THE ARM.

This allegation extends to two objects—the regimental organization, and the separation of the "technical" from the combatant artillery; but on the latter point it is only artillery officers who are complaining - Professor Michie being silent.

The regimental form, twelve companies to a regiment, is as old as the Revolution. After the War of Independence, two experiments were made of forming the Artillery into a corps, and each abandoned. The cavalry and infantry were also variously experimented upon in respect to their organization, but in 1821 the regimental form was re-enacted for the three combatant arms, and has maintained itself ever since. That form is imbedded in the history, tradition and experience of the country, and cannot be approached as if it were merely the subject of some new and theoretical project. Arranged into a proper number and kind of battalions, it does not seem, on its face, that the regimental formation is unsuited to the siege or garrison service of artillery, or even to the service of light artillery, considering the ever-growing tendency to mass that arm for administration and combat in the field. The suitability of the regimental organization to the wants and purposes of a Peace establishment has never been tested in the United States, where, until the epoch of the Civil War, the Artillery was employed and treated as infantry, and, like that arm, reduced to company or post units; while, for the service of that War, the companies were formed into light bat-

teries singly, with but local and temporary organization of a higher type. Since the War, the companies have been scattered by ones, twos and threes, no thought being taken to gather and station them in such wise that a colonel, as sub-territorial commander, could control the discipline, instruction and administration of his regiment.

The regiments are here; they have been here, with but an interval of five or six years, for more than a century; the two attempts to convert them to something else appear to have dissatisfied the experimenters; their capacities in War or Peace have never been fairly tried; for the latter state they can be tried now, easily and immediately; and yet it is proposed to dig up their deeply-planted roots and destroy them!

A chief of the Artillery, if anything more than a shadow, must be the inspector or the commander of the Artillery. If it is desired that he shall be the former, nothing more is necessary than for the officers of the arm to bring their wishes and opinions effectively before the War Department, so that some officer may be designated to perform the duties of inspector, should the Department agree with the movers. If it be desired to have a separate commander for the Artillery, precisely the same method should be followed, to be attended by the same result, should the Department approve; since no legislation is necessary to give the Artillery either an inspector or a commander. In the latter case, however, in addition to the natural *inertia* of the Department, the Artillery would have to encounter the resistance of the territorial commanders, as well as the cavalry and the infantry. The arm has been long incorporated with the territorial and field commands, and it would be difficult to cut loose from them now, and arrange a *modus vivendi* between a commandant of the Artillery at Washington and the several territorial commanders. If the Artillery is to be separately commanded, so, also, upon logical grounds, should be the cavalry and the infantry, and then the fixed territorial commands would have to give place to temporary columns, created by orders from Washington as each occasion should arise. Whether that would be a good or bad arrangement is a question not likely to be decided upon the isolated call of the Artillery for a commander, and if artillery officers feel that they must have such a functionary at their head, it would be well for them to stir up the two other combatant arms to realization of the same need, so as to move in force upon the War Department.

To all this it may be answered, that, at the dawn of military institutions in this country, the Artillery was given a commander, expressly commissioned as General of the Artillery, and that he did, in fact, and to all intents and purposes, command the artillery of the Continental Army, throughout its divisions and detachments. Admitting this, there are various circumstances that must be considered in the citation of the fact as a precedent. The Artillery, at first, consisted of a single regiment, whereof Henry Knox was the Colonel, and thereby Chief of Artillery without special creation. In the enlargement of the force, it was not remarkable that Colonel Knox, who had greatly impressed himself upon the Commander-in-chief and the military board of Congress, should be continued in the place of supervision, there being no permanent military establishment, nor military system, nor precedent, nor time nor motive for any thought or provision beyond the immediate need. The arm was kept together, under its own commander and the General-in-chief, for administration and discipline, and parts of it attached temporarily to the brigades for fighting purposes. As soon as the War was over, the commandant of the Artillery disappeared, to make feeble and incongruous re-appearances in the subsequent Wars with England and Mexico, and to partially come out again in connection with the artillery brigades, forming part of Federal army corps in the late war. All that we learn, therefore, from this examination of precedent is, that when the need of a commander for the Artillery was felt, it was supplied; that the want having passed away, the supply went with it; that as often as the necessity recurred, it was met, according to the wisdom and knowledge of the time, the provision lasting apparently so long as the need.

It is no doubt thought by many artillery officers that the now separate Ordnance Corps is in possession of the "technical" *materiel* and functions belonging to the Artillery, whereby the latter is maimed and starved, so that it is steadily declining, and must perish if restoration or relief does not come.

By the will of Congress, which has the prerogative to "raise and support armies," the Artillery of the United States is constituted as a fighting force, the matter of providing its *personnel* and *materiel* being intrusted to other hands than its own. This rôle of a combatant arm it does not wish to forego, nor does it consciously wish to add to it the rôle of a military supply department. So far as its members have spoken, their desire is to make

it an efficient fighting arm. If, as some assert, it is not, as artillery, an efficient fighting force, unquestionably it ought to be made such, without further delay than is necessary to determine the elements of inefficiency, the causes wherein they lie, and the means for their removal. The artillerists themselves assert, and Professor Michie sustains them, that they are without proper or sufficient artillery instruction or practice; that they are destitute of proper or sufficient artillery *materiel*, and that in two of the grades of office necessary to the performance of their duties they are permitted to become superannuated. The causes of these evils they allege to be their arrangement into regimental organizations; their separation from ordnance duties, and an antagonism between themselves and ordnance officers, resulting from their own just indignation at being deprived of their rights and opportunities, and the knowledge of the latter that they are supplanters, without the moral courage to make restitution or cease from spoliation. It is hereby admitted that the Artillery does lack instruction, *materiel* and promotion, as alleged by Professor Michie, and some causes thereof, other than those assigned by the artillerists, have been suggested; and remedies, other than their own, have been proposed. It now behooves us to consider the causes and remedies suggested by themselves.

As to the regimental organization, the question of its abolition seems properly to depend upon the larger question, whether the Artillery and Ordnance should be consolidated, and to this question we will at once proceed.

The duties of artillery are, first, to join in the military operations of attack and defense, with field, siege and sea-coast guns, and auxiliary and related arms; secondly, to keep itself in the highest possible state of efficiency for the performance of the services just enumerated.

In his article on the *personnel* of coast defense, Professor Michie sums up the qualifications of an artillery officer. Starting with a prefatory knowledge of mathematics, mechanics, chemistry, electricity and metallurgy, he must study gun construction and strains, gun-carriage construction, powders, projectiles, torpedoes and armor-plating; he must acquaint himself with the characteristics of forts, channels and harbors; he must understand ballistics, garrison administration and supply. All this theoretical knowledge he must confirm, correct and perfect by practical tests of armaments, and by various gunnery exercises; he must

be able to recognize and identify defects, and to devise remedies. When he is master of all this knowledge and practice, he is fit to administer any organization of the *personnel* or *materiel* of artillery, or both, and to direct the maneuvers and fire of guns in action.

Without affirming or denying that a man might be a good artillerist who never saw nor heard how a gun, a carriage, a charge of powder, a projectile, a torpedo, or an armor-plate was made, all that the Professor calls for could be supplied by a proper organization of the Artillery School, which everybody admits to be a necessary factor in a sound artillery education.

As before intimated, the first duty of an artillerist is to fight; the second, to know how to fight; the third, and last, to be prepared to fight. An ordnance officer has no business to fight, except under circumstances analagous to those that would call any other class of non-combatants to the field. His duty is to furnish the materials of combat; not to use them. His function is indispensable, but inglorious; so inglorious that the bubble honor of brevet rank is henceforth not open to him. In a military aspect, he is a hewer of wood and a drawer of water. True, he is somewhat pampered, for he is a skillful hewer and a cunning drawer, and exacts money in hand for the fame and fortune that can never await him in the bush. The offer of an artillery officer to yoke with him may stir his blood with memories of buried ambitions and anticipations, but for the public good the offer must be declined in his behalf. In time of War, with 2733 sea-coast guns, calling for 50,000 or perhaps 75,000 artillerists to man them, the thought is intolerable that a single artillery officer should be diverted to ordnance duties. Either the Artillery or the Ordnance would break under the strain, and the breaking of either would bring dismay and threaten ruin. In time of peace, it is practically impossible to keep up such an artillery establishment as **would meet**, in itself, the necessities of War, and this is a reason, only less potent **than the other**, for vetoing the proposition to convert artillerists to ordnance officers; for while the Ordnance Department is preparing and accumulating the *materiel* of War against the evil day, we need that the Artillery should be incessantly instructing and exercising itself in the best use of that *materiel*. The separation of the two offices seems, *a priori*, to rest upon solid reason. That suggests the inquiry whether, *a posteriori*, the separation has also the support of experience.

The history of the American Artillery is at least as old as that of the Continental Army. In that Army it was commanded by a chief of the Artillery, to whom was virtually intrusted, in respect of ordnance property and supplies, the powers of the Surveyor-general of the Ordnance in the British establishment; those of the Master-general of the Ordnance, which he thought he should exercise in the public interest, being reserved to a committee of Congress. There is little reason to suppose that the Artillery or its chief were at that time possessed of any especial fitness for the creation and government of an Ordnance, but there was a necessity for placing the business somewhere; there was at least more potentiality in the Artillery than elsewhere at the moment, and the practice would, to some extent, have the support of precedent. In the progress of time and the diffusion of experience, the Ordnance was withdrawn from the cognizance of the Artillery, but the new plan working badly in some of its parts, the control of the field administration was restored to the commandant of the Artillery, to be again taken away as soon as what was regarded as an efficient field service was devised. But even when stripped of the power of direction, the chief of the Artillery was, by prescription of Congress, kept informed of the state of the Ordnance at the fixed establishments, with power to bring his views upon such matters to the notice of the Congressional committee in charge, and his influence was at all times great, if not paramount. Near the close of the War, the control of the Ordnance in the field was again restored to the Artillery.

From the close of the Revolutionary War to the reduction of the military Peace establishment in 1821, the Artillery was not connected with the Ordnance, except as, now and again, an artillery officer, by provision of law or regulation, would serve as inspector thereof. In the year named the Ordnance Department, established in 1812, was merged in the Artillery; to be, in 1832, partly, and, in 1838, wholly, re-established, and so to remain to this day.

The above-stated facts intimate a settled persuasion, on the part of supreme authority, that an independent service for the Ordnance is to be preferred to a union with the Artillery. This conclusion is emphasized by the manner in which the Continental Congress stood out from the beginning, against powerful influences and the persuasions of their own helplessness in behalf of an opposite view. Beginning the War for Independence with a grasp

upon the Ordnance that it failed to maintain, the Artillery found itself still farther away from that Service at the time of the expected War with France, and wholly removed from it during the second War with England. The merger of the two Services in 1821 was confessedly a measure of economy—one of many retrenchments during a time of extraordinary financial distress—and whatever might have been the result under a scheme of administration less fatal to any possibility of efficiency, the fact remains that when the pressure of public poverty had been removed, and the worthlessness of the new arrangement demonstrated, the only means of improvement favored were those that led back to total separation.

No argument for a union of the Artillery and Ordnance can fairly be drawn from the course of domestic history, and the only valid historical argument is that which refers to the practice and experience of other civilized powers; the analogy holding good so far as it can be traced in every material part of the problem, and no further. The argument by analogy, however, is legitimate solely in a case of stubborn or nicely-balanced doubt, such as does not exist in the present instance; nor, if it did, could the analogy be traced through a sufficient number of circumstances to make the example of any value.

If the Artillery could be permitted to absorb the Ordnance without public detriment, or injustice to the Cavalry and Infantry, the consolidation would be lame and somewhat impotent unless it comprehended the Engineers. This necessary feature of any scheme worthy of being enacted has not yet been pressed upon public attention, but the arguments used in the one case apply, *mutatis mutandis*, in the other, nor is there wanting an historical precedent for such absorption of the Engineers.

There remains to be considered the question of an alleged professional antagonism between the Artillery and the Ordnance, disastrous to the former and hurtful to the public interest. Professor Michie in his exhaustive research into the state of the Artillery, does not appear to have come upon it, but artillerists have believed in it for forty years at least.

Under the act of 1821, merging the Ordnance in the Artillery, a field officer and four captains of the new establishment were assigned indefinitely to ordnance duty. These officers were opposed to the consolidation, and, three years afterward, promoted a separating scheme, under which their position would become

permanent and their rank increased. Within another three years they appeared in the *Army Register* as a staff department. In five years more they were separated from the Artillery and established as the Ordnance, and six years afterward the Artillery was ejected from the Ordnance by the abolition of the system of detailing artillery officers for the lower grades of the Ordnance.

These facts, while suspicious, are not conclusive evidence of the alleged antagonism. The act of 1821 was confessedly bad in execution, if not in conception; the officers of the Ordnance affected by it sincerely disbelieved in it from the first proposal; their prospects of promotion were hurt by it; nobody had a word of praise for the working of the plan after it was adopted; the scheme of separation in 1824 was a perfectly legitimate one, in view of the circumstances; the *Army Register* of 1827—not controlled by the officers on ordnance duty—conveniently represented current facts, if not theoretical and permanent conditions; the act of 1832 was an open and deliberate piece of legislation, based—so far as all the records show—upon public considerations alone, and the act of 1838, substituting permanent officers for short details, was right or wrong, according as the preceding act was one or the other. Therefore, whatever may have been the wise intent of the act of 1821, or the folly of undoing instead of amending it, there is absolutely no proof of an antagonism toward the Artillery, and everything done by or for the Ordnance can be explained upon innocent grounds.

After the reconstitution of the Ordnance, it produced, with modifications of its own devising, the new system of artillery *materiel* of which Lieutenant Tyler, of the Artillery, had procured and furnished the details as early as 1829, and took large credit as the creator of the system and the abolisher of the antiquated Gribeauval system. But it also appears that the ordnance officers began to work on the details furnished by Lieutenant Tyler as early as July, 1830, long before the separation of the two Services, and that in 1831, by reason of the still "unsettled state" of artillery *materiel*, a board of great officers was appointed to take the matter into consideration. It therefore cannot be true that the drawings obtained by Lieutenant Tyler were suppressed until the Ordnance could use them for its own glorification, or that the production of the new *materiel* was unduly delayed for the same reason, and as to the exaggerated claims to originality officially and unofficially made by that Corps, they

were, at the worst, no more than a little puffery after the fact, common to all sorts and conditions of men.

Colonels Wadsworth, Bomford and Craig, and General Benét, heads of the Ordnance, have all, in official utterances, intimated, more or less fully and directly, that the Ordnance was not a combatant part of the Army, but a supply department for the Army, the Militia and the Forts. In communications to the *Army and Navy Journal*, of March 14 and April 25, 1874, an officer of the Ordnance declined to accept the non-combatant rôle for his corps; but this anonymously and with carefully hedged limitations. In 1845, the acting Chief of Ordnance applied for an increased force of enlisted men to replace hired mechanics, as a measure of economy and improved discipline, and the next year—the threatened War with Mexico having broken out—got them in unlimited quantity. Thereupon he proceeded to man, equip and send into the field, as a part of the Ordnance, a rocket, a howitzer, and a siege battery; there being, at that time, thirty-eight companies of the Artillery equipped and serving as infantry, and only ten assigned to their appropriate duties. This conduct excited the undying indignation of the Artillery, and a perpetual fear that it will be repeated on some future occasion. It may be said, in abatement of both emotions, that the Ordnance was at the time in charge of an unworthy character, who was not long afterward ejected from the Army for grave offenses against the *status* of an officer and a gentleman; also, that under the honorable headship of that Service during the Civil War, encroachments upon the proper functions of the Artillery, if any, were rare and unimportant. It may further be remarked that the commander in the field, General Scott, himself an old artillery officer, saw nothing improper in the arrangement, and was evidently pleased with the accession of force and efficiency thereby gained. This, however, cannot avert the conclusion that it would have been better for all concerned had the incident not have occurred—for the Artillery, because its *esprit du corps* was wounded; for the Ordnance, because, however valuable and creditable its field service, the origin of that service was ignoble.

While the Ordnance was supplanting the functions of the Artillery in Mexico (with the knowledge, consent and approbation, if not the procurement of the General-in-Chief, upon whose memory, therefore, a large part of any censure must rest, if any be due), its proper duties were, in certain particulars, much neglected.

Lieutenant Bragg's light company, the only one possessed at first by General Taylor, was left nearly three months without its armament, and the guns, equipment and ammunition supplied for the armament of Fort Brown were disgraceful, and exposed the garrison to danger. This is probably to be attributed to the absence of Colonel Bomford, the head of the Ordnance, and the supplying of his place by an incompetent and otherwise objectionable substitute of whom mention has already been made. Bragg's equipment, though unduly delayed, excited his unbounded admiration when received and tested. But while the Ordnance has no cause to be proud of its strictly professional achievements in Mexico, there is no reason to suspect that rivalry and antagonism toward the Artillery had anything to do with an inefficiency that, happily, has no parallel in the history of the corps. The Ordnance had no antagonism to the Infantry, which arm likewise suffered from dilatoriness in issuing the percussion, to replace the flint-lock musket.

After the Mexican War, the acting Chief of Ordnance tried to secure to his own corps the garrisoning of the forts; but this the War Department would not permit, and a speedy dismissal from the Service terminated his questionable activity.

The officers of the Ordnance engaged in combatant duties in Mexico outshone the Artillery in brevets, and in special mention in the reports; but this was a matter between the Artillery and General Scott, and need not be more than mentioned.

The Ordnance has been accused of lobbying against the Senate bill of 1852, to give the Artillery a head, but no proof has yet been tendered. The same remark applies to the breaking up of the Artillery Department at West Point, and the distribution of its functions between the instructor of infantry tactics and a new Department of Ordnance and Gunnery.

Since 1876, returns of artillery fire have been rendered to the Chief of Ordnance, by order of the War Department, and he has therefore been accused of usurping the office of Chief of the Artillery; yet it seems proper that those whose business it is to supply guns and ammunition should know how they operate when used. If, however, the returns are needed for the instruction of the Artillery, as well as for the guidance of the Ordnance, the failure to distribute them among the batteries should be remedied.

Complaint is made that while supplies of powder and projectiles are unlimited at the proving-grounds of the Ordnance, a beg-

garly annual allowance of seventy-five rounds of shot or shell for sea-coast guns, per company, is all that is granted for heavy artillery practice. The explanation of this would seem to be, first, that guns and projectiles must be sufficiently tested before they can safely be issued for purposes of practice, much less for purposes of defense; secondly, that the allowance for artillery practice is a mixed question of the views of the commanding general, and the amount of ordnance appropriations. It may be observed, here, that since the death of Major-General Brown, sixty years ago, no general-in-chief, in time of Peace, has particularly interested himself in the Artillery, though three of the successors of that lamented officer began their career in that arm; and this fact suggests the question whether it is that our fundamental military system does not permit of a higher development of artillery than of the other arms, or whether artillery officers have themselves been wise or efficient in the measures heretofore taken to improve the position of their corps.

The historian of the Artillery has charged the present Chief of Ordnance with the exclusion of artillery officers from the boards on armament of the forts. Upon principle, such an exclusion is clearly wrong, for boards of that character need the knowledge of officers experienced in the life and work of sea-coast garrisons; but if, in particular cases, the Chief of Ordnance, accepting the historian's own estimate of the present state of his corps, has merely sought to preserve the efficiency of such boards by shutting out unqualified persons from membership, he has done no more than his duty, and is only censurable in the event that he has purposely contributed to the professional disqualifications of artillery officers.

Lastly, it is asserted that the admitted improvements of *matériel* effected by the Ordnance have but little benefited the Artillery, because the Ordnance being, of necessity, the artillery staff, the separation of head and trunk benumbs the faculties of the latter. However near to correctness this proposition may be, the fact remains that the capabilities of the trunk, apart from its supposed head, are mere matters of conjecture, since they have not yet been put to proof. Furthermore, so long as other good and sufficient reasons appear to explain the benumbed condition of the Artillery, it is premature to inquire whether the proper head of the Artillery is the Commander of the Army or the Chief of the Ordnance.

On the whole case, it is not shown that there is any necessary or inevitable antagonism or rivalry between the two Services, independently formed and conducted. At the very worst, the presence of the Ordnance batteries in Mexico was but an evidence of bad discipline and weak administration—it would be merely stating a truism, and not expounding a principle, to say that if the Artillery and the Ordnance had been one body, the disagreeable incident would not have occurred. Even if they had been one corps, there would have been fratricidal strife, had officers habitually on ordnance duty attempted to reap the glory that their brethren of the garrisons would naturally have regarded as their harvest.

CONCLUSIONS.

It is now time to draw together the threads of this prolonged and wide-spread discussion.

Promotion. This is too slow for the public good in the grades of captain and first lieutenant. The remedy is to increase the majors and lieutenant-colonels for light artillery; to dispense with the extra first lieutenants of the foot artillery; to graduate the age of retirement in the several grades; to establish a substantial pass-examination for captains and first lieutenants, before promotion, that will weed out negligent or incompetent officers, and to encourage resignations in time of Peace.

Instruction. This should be theoretical, imparted at a proper technical school, and practical, imparted and conducted from suitable stations. An excellent location and "plant" for a school already exist, and, by good fortune, have already, in name, been assigned to the uses of the Artillery. All that is needed in that direction is that the War Department should revise and, so far as necessary, re-arrange the courses of that school, with corresponding modifications of staff and administration, and apply annually to Congress for such sums as may be really necessary to maintain and strengthen its character. For the practical instruction, there is need that the Artillery should be concentrated in good force at a few well-fitted posts, and the distribution so arranged as to favor the development of regimental *esprit*. It is fortunate that this important matter of professional instruction calls for no re-organization, nor for fundamental changes in administration.

Matériel.—This important part of the make-up of an artillery establishment is chiefly remarkable by its absence at present, but

the types of the new systems are well advanced, and there seems no reason to doubt that the *matériel* will be ready for the Artillery as soon as the latter shall be truly ready for the former.

Organization.—The present regimental form is old, familiar, and accordant with American tradition and experience. There is nothing wrong about it theoretically, and as it has never been fairly and fully worked since the Revolution, it is impossible to adjudge it wrong in practice.

The Artillery, being a military body designed to use certain species of ordnance for combatant purposes, in conjunction or co-operation with other military bodies, assigned to the combatant use of other species of ordnance, should not, as between itself and those other bodies, nor as between itself and the Ordnance Corps, be blended with an administrative staff of non-combatants, designed for the fabrication, procurement, custody and handling of ordnance supplies and stores. If so blended, a process of separation, induced by natural causes, would begin from the moment that substantial union might be effected. It is highly significant that the latest and ablest commentator on the state and wants of the Artillery failed to find indications of necessity or advisability for such a consolidation, but, on the contrary, advocates a separate, even if a new organization, for the combatant arm. No unavoidable antagonism or rivalry exists, has ever existed, or can arise between the two Services by reason of their separation, and there is inducement on both sides to harmonious co-operation if each side recognizes and conforms to its own function.

Morale.—The *personnel* of the Artillery is not bad, nor is it less good than at any prior time in its history. The preparatory instruction of the officers is good, and better now than ever before. The whole body shares the spirit of inquiry that is abroad everywhere, and the means of satisfying and gratifying that spirit exist in measure and character beyond any former experience. The instruction, greatly as it needs improvement to bring it up to current standards, far surpasses the standards of the *ante-bellum* period. The personal circumstances of the officers are better than they were twenty years ago, and there is an unceasing tendency toward improvement. The act of 1866 for the first time provided a Peace establishment that exempted the Artillery, in point of fact, from the functions of unmounted police in the Indian country. The growth of the country in population, wealth and luxury, the increased

power and danger of War, and the multiplication of sources of external and internal disturbance—all these are working with the civic population in behalf of a standing Army, which, if small, shall be highly efficient, well-posted near the great cities and lines of communication, and the members of which, in every reasonable particular, shall be comfortable, and therefore contented, in feelings and surroundings. Certain emanations from the artillery officers of thirty years ago and upward, painted the professional qualities and fortunes of the Artillery, in that day, in the blackest of terms; yet all know how efficient those essayists proved themselves when the hour of trial came, and what honors they won on one or the other side of the Civil War; though it must be confessed that iron circumstance prevented many of them from obtaining more substantial rewards. The graduate of the Military Academy of the present day looks out upon a prospect that his father or his grandfather, in like circumstances, might well have envied, and from this prospect there is no reason to fear that the Artillery is to be perpetually or long excluded.



THE ATTACK AND DEFENSE OF MODERN FORTIFICATIONS, AND THE LATEST EXPERIENCE AND PRINCIPLES IN MODERN SIEGES.*

By CAPTAIN JOHN G. D. KNIGHT, U. S. A.,

CORPS OF ENGINEERS.

LET us first settle what shall be considered modern sieges. The Siege of Sebastopol, with the great use, for the first time, of hasty intrenchments, and its lesson of the value of a complete investment by its example of an incomplete one, occurred during the lives of a large majority of us: the periodicals of to-day still present to us incidents of the sieges of our Civil War, making it seem even more modern than it is; less than twenty years ago, the defeat of the French by the Germans was accompanied by the sieges of Strasbourg and Belfort and investments of other cities; and just ten years ago the siege of Plevna lacked scarcely three weeks of its completion.

After all is said, the question concerns not the date of the sieges, but the consideration of what has happened to necessitate any change in the method of attack and defense of places. This settled, we can readily consider that, for all practical purposes, a modern siege is one that has been carried on in accordance with the requirements of the latest methods of attack and defense. Just as attack and defense on sea are regulated to a great extent by armament, so on land they vary with the weapons of the troops. In both artillery and small-arms, great changes have been made since 1870, but as they had been in part initiated just prior to that year, I shall assume that the sieges of that and later years, are modern sieges, though it is not my intention to do more than, from time to time, refer to them to illustrate points as they arise. In fact, it is difficult to find full examples of all the periods

Read before the Military Service Institution of the United States, Oct. 20, 1887, Major-General Schofield in the Chair.

of a regular siege. It is said that the Franco-Prussian War produced but two sieges; and the siege of Plevna was no more than a completed investment, terminated Dec. 10, 1877, four months and twenty days after its inception and little more than a month after the completion of the investment, by Osman Pasha's change of policy; from always awaiting an attack, he finally attacked, tried to cut his way out, was defeated and his army captured. Here let me advise the study of the siege of Belfort: all rules except those relating to countermining and meeting assaults were exemplified, and two features of the defense are noteworthy—the one, utilizing guns on all fronts of the main work to reply to siege batteries opposite but one front; the other, the organizing of detachments for continually annoying the enemy, the detachments being limited in their operations to sectors of the zone of defense to which they had been assigned on account of their special acquaintance therewith.

The part of siege artillery being to answer and silence the heavy artillery of the place besieged, generally guns of the largest calibers; to render the terrepleins untenable; to destroy shelters there; to ruin all the defenses of the place; to open, from a distance if possible, the ramparts to the besiegers by destroying scarps and bringing down parapets into the ditches, so as to form practical ramps for the assaulting columns; any change in artillery either siege or garrison, must insure a corresponding change in siege work. A change in this work will also follow greater or less facilities of railroad communication. Mobility is for siege artillery but of secondary importance; the size of a piece to be used is a question of transportation. Where no railroads exist, nor water transportation, the strength of a pontoon bridge may limit the caliber of the gun; otherwise, only pieces of exceptional weight need be excluded from the siege train.

Independently of transportation, artillery has developed, and a good idea of this development is obtained by comparing the artillery of the French in use before 1870, with that adopted thereafter.

The most powerful guns of the old siege trains were:

	Weight in lbs. of		Initial	Maximum
	Gun.	Projectile.	Velocity. ft. p'r sec.	Range. Miles.
Muzzle-loading rifle.....	4542	53	955	3.2
12.8-in. muzzle-loading smooth-bore mortar.	2866	166		1.7

This latter model dated back to 1839, and was described as having not very great accuracy, and hence was to be used only against targets of some extent, and as much as possible at the shorter ranges. Since 1870, there have been adopted, besides other smaller guns:

	Weight in lbs. of		Initial Velocity.	Maximum Range.
	Gun.	Projectile.	ft. p'r sec.	Miles.
6".7 rifle.....	5578	88	1523	5.6
8".7. b. l. rifle-mortar.....	4409	216	853	3.4

And experiments have also been made with a rifled mortar of 10".6 and a small rifled mortar of 3".5.

Here, then, for direct fire, we have the weight of projectile increased from 53 to 88 lbs., its initial velocity from 955 to 1523 ft., and its range from 3.2 to 5.6 miles; and for vertical fire, the weight increased from 166 to 216 lbs., and the distance from 1.7 to 3.4 miles.

In the armament of works, instead of a 6".3 breech-loading rifle throwing a projectile of 70 lbs., with in. vel. of 1040 ft. to a distance of 3.9 miles, and a rifled m. l. howitzer of 8".7 throwing a projectile of 176 lbs., with in. vel. of 788 ft. to a distance of 3 miles, there is a breech-loading rifle of 10".6 sending a projectile of 397 lbs. with in. vel. of 1542 ft. to a maximum distance of 7 miles.

For flank defense we find in place of small howitzers, machine guns of more rapid fire, longer range and greater accuracy.

Such changes as these in siege artillery, have necessitated a material change in methods of fortification. Profiles have been changed so that the parapet is 26 and 30 ft. in thickness in place of 20; the ditch is deeper, 30 instead of 20 ft. and narrower, 66 ft. as a maximum, and sometimes but from 26 to 33, instead of about 131 on an average; the covered way is narrower, a mere pathway; the terreplein is 15 ft. below the interior crest, instead of 8; the artillery banquette is 8 ft. 5 in. below the interior crest instead of 6 ft. 7 in., and, on account of greater recoil 30 ft. deep instead of 20. In a general way the crest has been raised, hence an increase in the height of the exterior slope, and consequently a notable increase of the surface covered by this slope.

Formerly the advanced works were quite important, because the near attack was then considered the most formidable; but the tendency now is to abandon them. In all French works con-

structed since 1870, after the bastioned system, all outworks are suppressed, save an occasional *tenaille*. These were effective in delaying the besieger close to the place, but their presence increased the difficulty of covering the masonry of the body of the place, and, moreover, it is very probable that the artillery-fire at long range will have destroyed them before the besiegers reach the *glacis*.

Detached works were little employed; now, on account of the great part they play in the defense, they assume a more and more marked importance.

All works must give sufficient protection to the very heavy guns now used, and at the same time facilitate their service and supply. Ramparts of permanent works are then arranged more particularly with reference to artillery fire and should be provided with solid shelter-proofs in sufficient quantity to protect men and material. Either the importance of this was not fully realized, or else its application was too long delayed by the French in 1870, and hence followed the loss of many places. Since that they have provided shelter of every sort in the forts recently built.

These are details of a general plan which for a fortified place abroad, would comprise an exterior line of forts and an interior or main work. These two are necessarily remote one from the other, and in the intervening space positions are often to be found favorable to the defense, and which should not be abandoned until after the fall of the detached forts. On these, intermediate works will be constructed, but not generally in time of peace; they will only be necessary in the zone of attack, and what this zone will be is generally well determined by natural features or by lines of communication: the works will be heavier than field works and of a semi permanent type.

Another factor to be considered is the development of small arms. Though this was under way prior to 1870, still since that year most foreign armies have changed the rifle with which their infantry was supplied, and a further change in the near future is probable. The development has been in the line of breech-loading, reduction of calibre and increase of velocity, giving flatter trajectories, hence increasing the danger in the nearer phases of action, greater accuracy, range, and rapidity of fire, and increasing the number of rounds of ammunition possible to be carried. What has been attained is briefly and forcibly set forth in Brialmont's *Battle Tactics of the Three Arms*: 1st, the rifle of small

caliber has more accuracy at 1300 yards than the smooth-bore had at 275; 2d, the effective range of the first is about 1650 yards, while that of the second did not exceed 450; 3d, that the soldier sitting down, kneeling, lying or sheltered behind a wall, a rock, or the trunk of a tree, fires six times faster with the present rifle than the soldier standing used to fire with the smooth-bore; 4th, that this rapidity of fire can still be increased by the use of an auxiliary magazine, or of a magazine gun, either of which would enable an ordinary soldier to fire sixteen to eighteen shots per minute, until his cartridges were exhausted; 5th, that the new gun gives five failures per 1000, while the old flint-lock gave 300, and in rainy weather, even 800.

With the modern rifle, the sharpshooter is able to do considerable execution up to even 3000 yards; and when numbers have replaced individual skill, we find results of long-range firing as set forth in the statements of Generals Todleben and Treddeler; the first wrote, Jan. 30, '78, Bresiova. The fire of the Turkish infantry hailed bullets more than 2200 yards. "The most heroic efforts of our troops were fruitless, and divisions of 10,000 men found themselves reduced to an effective of 4000 to 5000;" the second, who took part in the attack of Gorny Dubnik, says, "We commenced to lose men at 3300 yards; at 2200 the losses were sensible."

A slight idea as to the relative effect of infantry and artillery fire is given in a work on "Infantry Fire at Great Distances," which states that from experiments recently made at Madrid with Armstrong guns, it was concluded that 1000 men would produce the very same effect as a battery of six pieces firing ordinary shell, for the same time.

Now having considered improvements in small arms and artillery, and modifications in methods of fortification due to the latter, let us further consider necessarily resulting modifications in methods of attack and defense of fortifications.

An attack, as we know, may be made in one of five ways: by surprise, by open assault, by bombardment, by investment, and by regular approaches, combined with investment and bombardment.

In the first three, old methods are still in force except so far as they relate to the distances at which batteries open fire, the greater use of curved fire, and to the tactical formation of assaulting columns. The defense must meet curved fire, by greater

use of all forms of bomb-proofs and blindages. Artillery, subjected to heavy fire from the besiegers, must be protected, when possible, from injury, that it may be brought into action when the assaulting columns are forming. Columns moving to the assault, must use the most rapid means of removing obstacles and destroying flanking defenses; high explosives are effective for this purpose, and how to transport and use them must now be a matter of information and study.

Whether assaults should be made by day or by night is still a mooted question.

During a bombardment, the timid may from time to time, bring heavy pressure on the commanding officer to induce him to surrender. The statistics of bombardments may enable him to withstand this. It is advised to present to the populace such assuring statistics as these, that out of 68,000 inhabitants of Strasbourg, the German bombardment lasting twenty-eight days, killed but 300 and wounded only 800; that Belfort bombarded seventy-five days, lost by the bombardment but 50 out of 4000 inhabitants.

The old close investing lines threaten to disappear in the presence of fortified positions of great extent, occupied by a large army, and surrounding a largely populated city. Prospective starvation will be a strong ally of the investing force. The enormous daily consumption of provisions can only be maintained by a continued supply; and the principal object of an investment must be the occupation of such positions as will intercept water or railroad communication, or so command it as to prevent the restoration thereof when injured or destroyed. In the history of earlier sieges of Paris, before the days of railroad communications, cities on water routes were positions analagous to those now to be selected and fortified on the lines of railroad communications. The line of investment will consist of a line of strong positions, selected according to accidents of the ground and railroad routes, each position to be susceptible of a strong defense until reinforcements arrive from neighboring forces.

In cutting communications, it is well to remember that a telegraph wire was found leading from Paris, in a river bed.

For the defense, there is nothing new save in so far as each of the detached works supports efforts to prevent the occupation of positions which above-mentioned considerations would make important.

How modern lines of investment have been arranged, and

how investing forces have been distributed, can be well studied from the German investment of Paris; such a study will show the advisability of planning in time of peace how to meet a siege, if only by one incident, the destruction by the French, of a bridge over the Marne, which by its position was easily strongly defended, and which after its destruction was soon replaced by its destroyers, by a pontoon bridge. A hint though as to the removal of plans thus made, from the place whose siege is studied: the Germans, attacking Belfort in 1870, are said to have been considerably aided by a study of a theoretical siege of this place found by them in the archives of Strashourg, and in which was valuable information as to the nature of the site and plans of the fortifications. This, however, is hardly to be credited, if we recall the topography of Belfort and of the surrounding country, and its sturdy defense of the place.

The regular siege with its investment and bombardment, its artillery positions, parallels, and approaches, all seem to have ceased to be the preparation for an assault. In the memoranda compiled for the guidance of officers serving in the defenses of Washington, referring to the loss of honor if a fort be either abandoned or surrendered without resisting at least one assault, is stated, "Such is the inexorable law of war, and it should not be forgotten that it holds good whether or not there are other works in the rear to which the garrison might retire with comparative safety." This so-called inexorable law of war has been sadly violated of late. Resistance to a siege has for its object, to gain time for a relieving army to come to the assistance of the garrison: the besieged strive to lengthen the siege, the besiegers to shorten it. To lengthen the siege, every advance must be contested, but the struggle may not always go so far as meeting an assault. Such conduct may result in a loss which the besieged an not afford; a loss which may prevent an interior work being occupied by the garrison of one already rendered untenable, and thus hasten the fall of the main work. Scarcely a regular siege in the Franco-Prussian war; no regular siege in the Russo-Turkish war. In the former, place after place, including Paris and Metz, fell without this inexorable law being adhered to. When artillery-fire has destroyed all shelter, when approaches have rendered it possible for storming parties to concentrate under the very scarp of a place, the advisability of resisting an assault is not always apparent. Certainly the abandonment of the batteries of the

Perches, outside of Belfort, did not detract from the credit of the defense. So long as a place is tenable, let it resist assault. The rule of withstanding one assault applied to a fort of the old type. In this outwork after outwork was taken without assault, having been first rendered untenable; and the assault was withstood in the main work. Now in place of these advanced works, we have the detached forts and intermediate works; and the rule should not be rigidly applied to these any more than to a salient place of arms, or a redoubt, of the old fronts. With simply a line of earthworks, with no second line to support it, the case is different, and the law of war should be held inexorable.

Sieges have become artillery conflicts on an extended scale, the part of the infantry being more passive. The skill in the attack is shown in so locating batteries as to quiet the guns of the work, drive the garrison from the crest and ruin its cover, while at the same time preventing the besieged from damaging these batteries.

The skill in the defense is to prevent the besiegers from damaging guns or men, and from gaining ground forward without great expenditure of time and material.

The first batteries of the attack are to be established from 3300 to 2200 yards from the detached forts. Devices to prevent the besieged gaining their range, are earthen or foliage screens, to be placed not immediately, but from 150 to 300 ft. in front of the battery; the earthen screens may resemble a parapet, and be extended to the right and left beyond the guns, to render their location by the enemy difficult. Depressing gun-carriages are of use.

The first parallel should be within effective rifle range of the defenses, so that infantry fire may aid the artillery in keeping down the fire of the work; owing to the fear of modern rifles this distance has been set down as 1100 yards; 900 are enough.

The second artillery position should be from 1650 to 700 yards from the work, according to the site.

The location of the second parallel is influenced now as heretofore by the distance therefrom to the fort as compared with that to the first parallel.

The third parallel or the last parallel, whatever their number, is located at the supposed limit of the ground defended by mines.

All approaches are deeper and narrower than before, both to give better cover, and because guns will not have to be brought

along them, curved fire from the second batteries, mostly in rear of the second parallel instead of connecting therewith, being probably able to accomplish all that may be required; and since the second batteries include those of enfilade, whose location used to limit the sector of approach, the location of approaches is no longer restricted to within certain limits, as between two lines, one to the right, the other to the left of the capital, and each from thirty to forty-five yards distant. This sector may now be so chosen as to fall on ground which is best concealed from view, or which most facilitates the work of construction.

Neither the day nor the night is necessarily the better time for running approaches. The Royal Engineers' *Aide Memoire* says that work can often be better pushed at night than by day on account of the powerful, accurate fire of the artillery of the defense; the Chatham course of instruction says that experience gained in the attacks of French fortresses in 1870-71, shows that if the attacking artillery and infantry can, by accurate and powerful fire, completely silence the fire of the defenders, the works can sometimes be pushed on more rapidly by day than at night when work is always more difficult of execution. So here again the progress of a siege resolves itself into a question of superiority of artillery fire.

A new method of mining attack has appeared, based on boring or drilling. Having bored a hole obliquely downward a distance of from six to at most ten inches, a small charge of dynamite is introduced; its explosion produces a chamber, into which powder may be introduced, and thus a mine prepared in very short order. This exploded serves as a crater, from which the operation may be repeated; and by a succession of such works, the galleries of the defense may be very rapidly reached.

For an active defense, as distinguished from a passive one restricted to the limits of the work, the forces should be divided into two parts; one to act as garrison proper, the other to keep the field in a rather extended zone about the place. At first this latter force must do all possible to delay the investment, and must at the last moment destroy routes of communication when no longer of use to itself. This, though, must be at the last moment; not on the approach of a reconnoitering force, or other force which may be repulsed. After the investment is complete, portions of this field force may be assigned to certain sectors, as scouting companies, with the object of retaining therein men who

become thoroughly familiar with the ground, and hence better qualified to continually annoy and worry the besiegers. Villages, woods, and other defensive positions outside of the outer line of works are to be occupied; intermediate batteries in the intervals of this line to be constructed, and a secondary line between this and the main work. The outbreak of the Franco-Prussian war found the works at Belfort outside of the main work but little advanced; efforts were made to remedy this and thus to extend the zone of action, with the result that ninety-eight days of siege, including sixty-eight of bombardment found the Prussians where they would have commenced the siege had it not been for the extension. Even the first intrenched village was not lost until after sixty-five days of siege.

Field artillery is essential to an active defense; sorties by its aid, become of greatly increased importance. Bomb-and-shelter proofs must be constructed in the works and in the enclosed city in these days of Krupp rifled mortars throwing 172-lb shells, with percussion fuzes; and rope mantlets are, on account of perfected rifles, now of even more importance than at Sebastopol, where they were so effective. Observatories connected by telegraph and telephone lines, are now extensively used to give prompt and precise information of the location of batteries constructing, or constructed by the besiegers. The guns to reply to batteries opening in different sectors and at different ranges therein, are designated beforehand; employing guns which cannot be seen, for curved or direct fire, prevents the enemy from regulating his aim for reply. Advanced works signal with different colored lights to works in their rear, the direction of night attacks; and in place of calcium lights, the use of which at Fort Wagner's siege was novel, a portable electric light apparatus is now used, consisting of a portable engine, a dynamo and lamp, a projector and a reel of conducting wire, all placed on one truck which may be self-propelling and of use in the transport of guns or stores. Circles varying from 200 yards in diameter at 1100 yards distance, to others of 190 in diameter at 4.3 miles may be illuminated by the various sizes of dynamos and projectors.

Volley from sharpshooters, firing at ranges of from 1000 to 1100 yards, after each shot, may interfere with re-pointing siege guns.

Though not necessarily novel, it may be well to insert here a few points always of service to the defense.

In cutting down brush to clear the view, leave the stumps high enough to serve as anchoring pickets for wire entanglement. This way of cutting is more difficult than cutting it close to the ground, and hence less likely to be followed.

Guard against accumulation of ammunition in the rear vicinity of guns; if additional guns mounted on siege-carriages can be used, their effective ranges may be increased at times by sinking the trails. Some 53-pounder rifles at Belfort had ranges of 4.3 miles, thus giving them or several more than had been previously secured for these guns at Strasbourg or elsewhere.

Troops preparing intermediate works, should if attacked, withdraw to the rear of redoubts, never within them.

Dangerous communications might be temporarily interrupted during a siege; hence the advisability of supplying outworks at a time with provisions for a few days use.

Follow the successes of the besiegers in one direction, by sorties in force against them in another.

*That they may become familiar with their duties, assign the same parties to the defense of the same portions of the work; and that points of attack may be reached with promptness, and everything be in readiness to follow up repulsed attacks, require officers to remain with their men, and near their fighting points.

Changes in regulations for the guard at times are advisable, with a view of turning the attention of sentinels to the enemy, rather than to the coming of the officer of the day.

Prevent fraternizing of outposts of the two forces and resulting carelessness.

Take care that reconnaissances are not made by the enemy under guise of flags of truce; if tendency to improper use of these be observed, notify that flags of truce will only be received at regularly designated places.

In engagements in the outer zone, avoid risking all for victory when defeat may possibly compromise the later defense of the place.

The attack and defense of field fortifications will always be of more importance to us than those of permanent works, because of our foreign policy, of the sea-coast locations of our permanent works, and, I might add, because of our probable lines of operations toward our frontiers in case of War. Hence, I have thought it advisable to dwell more upon this part of my subject, and to give the latest established methods thereof somewhat in detail.

The attack comprises, first, the reconnaissance ; second, the choice of the point of attack ; third, the preparation by artillery ; fourth, the infantry combat ; fifth, the destruction of accessory means of defense ; sixth, the assault.

Reconnaissance of the position. The object of this is to give to the assailant all necessary information of the nature of the site occupied by the defense, his effective force, the dispositions taken, the works constructed, and the obstacles utilized or originated by him, to arrest the march of the attacking force. Ordinarily a relatively weak force is charged with it ; this force tries to surprise the defense, and, if need be, engage him, not to defeat him, but to oblige him to disclose his dispositions. Engineer officers accompany the reconnoitering party, to report as accurately as possible upon the works thrown up. When the desired information is obtained, or sooner if the defense shows itself in force, the reconnoitering party withdraws, only in the latter case, to return later to finish its mission.

Choice of the point of attack. Posted as to the dispositions of the defense and knowing how the occupied positions may be approached under cover, the most suitable point of attack is chosen.

This choice is influenced by considerations, of which some are tactical, others strategical. The first lead to seeking the weakest point, the most pronounced salient, that one easiest to cover with cross-fire, or that portion of the line on which defensive works have not been sufficiently pushed. The same reasons cause choice to be made of a salient placed opposite tactical debouches, *i. e.*, established on a point of easy approach under cover. Yet tactical considerations are not always the weightier. A defensive line may be easy to pierce at some one point, and yet it does not follow that the partial victory thus resulting will be of much value. See Skobelev at Plevna, where he carried the works in his front, but as they were not only open to the rear but were also commanded on nearly every side by other works, he was driven out the day after his success. Hence, considerations of a strategical order often have more weight than others, and lead to an attack on the strongest point of the position because its fall brings with it the defeat of the enemy.

Artillery preparation. In this will be found the most effective means of counter-balancing the advantage which the defense hopes to draw from the dispositions taken for cover and the

works thrown up to strengthen his position. From the start, the greatest possible number of pieces must be brought into play, so as to rapidly gain the necessary superiority. Assembled in tactical groups, to facilitate the co-ordination of efforts, batteries will be established at distances varying from 3300 to 1600 yards. Preference will be given to positions of some slight command, giving extended views, and to those from which the principal lines of the defense may be enfiladed. The pieces, supported by infantry and protected if necessary by hasty epaulements, will endeavor to silence the opposing artillery, to destroy the shelters and defenses which can be seen or whose presence will have been signaled. The time given to this artillery preparation must vary with the character of the works attacked. While the Russians were defeated with terrible loss in an assault at Plevna after three days' bombardment by artillery four times superior in number to that of the Turks; they, on the other hand, were completely successful in their assault at Lovtcha after a nine hours' bombardment of the Turkish lines which were much weaker than those at Plevna, and were without bomb-proofs. Reconnaissances should be made to determine the result of the firing, and to make sure of the dilapidated state of the works.

The importance of this preparation is evident, or if not, may be made so by numerous examples, of which I give two. Aug. 18, 1870, at the battle of St. Privat, the Prussian Guard attempted an attack on the village of the same name without sufficient artillery preparation. It lost 6000 men in less than fifteen minutes, and was obliged to fall back to avoid complete destruction. Towards the end of the same day, the Prince Royal of Prussia having advanced his artillery, concentrated on the village the fire of fourteen batteries, and after a cannonade of some length, attacked it with new troops which this time gained the position.

In 1877, the Russians before Plevna attacked the Grivitza works three times: July 20, July 30, and Sept. 11 and 13. The first day the regiments hurled themselves on the Turkish intrenchments, and were obliged to withdraw with a loss of nearly 3000 men. The second day, with great effort they took the first lines severely shaken by artillery, but found in rear a second line of intrenchments not sufficiently cannonaded; their attack at first successful, was checked and remained absolutely without advantage. It was only at the third attempt that instructed by experience and reinforced by new troops, they seized the works.

The object of the artillery preparation is three fold: first, to silence the defender's artillery; second, to destroy or injure his works; third, to inflict such a loss upon him as to demoralize his men. The first object depends for success upon the relative strength in artillery of the two parties to the struggle; the third, upon the extent of the defender's works and the number of bomb-proofs with which they are provided. Whether the second can be attained is still unsettled.

Gen. Todleben, who directed the investment of Plevna, writes of the artillery preparation and the defensive measures against it, as follows: "The volleys of our artillery, concentrated now on one redoubt, now on another, appeared at first to produce a great impression upon the enemy; but soon they only stopped work during the day. The enemy was not slow in acting; the garrisons of the redoubts were withdrawn and placed in trenches at some distances from the works; deep and narrow ditches only were occupied by the Turks. Of course, against trenches and ditches our artillery was powerless. As for the reserves, they were hidden behind natural features of the ground, or removed beyond range. Consequently, at Plevna, artillery played but a secondary rôle." Possibly this strong assertion was in Capt. Greene's mind when he wrote that the second object of artillery preparation—destroying or injuring works—is one that "can not be attained;" and again, that "for strong lines with bomb-proofs, artillery is of very little, if of any use."

However, this is not the opinion of the Bavarian general of artillery, Von Sauer, who blames the Russians for using only direct, and not trying plunging fire. He says they failed to break up the garrison of the works "for want of sufficient knowledge of the laws of the angles of fall of projectiles." He adds, that with vertical fire of the present artillery, the defenders of a parapet can no longer stay on the banquette.

This seems to be also the German way of looking at it; for they have collected many guns at Metz, to be used for attacking and taking, if need be, the border forts of France. It is probable that they count not only on plunging and vertical fire, using shell of even six calibres length, but also on direct fire with projectiles charged with high explosives. Schumann, who is, however, associated with Gruson, claims that there is no longer any doubt that, with the methods of fortification now in use, batteries are no longer given sufficient cover to endure an artillery combat.

upon the defenders, that the latter are driven from their position. An actual column of assault is necessary.

This column has followed about 900 yards in rear of the advancing head of column, and gains on it only when the latter has reached the glacis. The first assailants are then too near the position for the artillery of the defense to continue its fire, its gunners being exposed to the fire of the skirmishers. Infantry fire alone is to be feared, and it is fair to suppose that the defense is so fully occupied with the head of column, whose fire must now be as heavy as possible, that the assaulting force may advance without being obliged to assume an open order. We must not count upon its being able to advance in closed column; the formation probably taken, will be made up of a line of groups more or less numerous; this arrangement being also the best for passing obstacles by the gaps made by the pioneers.

Are the troops of the head of the column to assemble in groups to pass these gaps when opened, and to further advance to the crest of the glacis, or must they keep their position before the glacis until the arrival of the column of assault which will carry them with it into the work? This last disposition must generally seem preferable, on account of the danger of flank movements under the fire of so near an enemy, and of the slackening of their own fire for some minutes.

The fire of the assailant must be as heavy as possible to drive the defense from the banquettes, and to supplement the artillery fire, whose range must be increased so as to avoid hitting its own troops and which now shakes the enemy's reserves, or prepares the attack of the works in rear, if they can be seen.

Now is the time to order the assault. The column of attack dashes on to the crest of the glacis, and if possible, into the ditch. If obstacles are there, the pioneers who have followed the column hasten to destroy them, and to block up the embrasures of flanking galleries; the entire force follows as soon as it can. Masters of the ditch, which gives an opportunity for rest and assembling, the assailants rapidly spread around the entire work so as to assault simultaneously on all sides, and at a signal given without delay, climb the parapet. Then commences a hand-to-hand conflict with the defense, in which the morale is with the assaulting party flushed with its first success, and which must, in all probability end with the capture of the position.

Should this the first attack be repulsed, the assailant retires to

In many cases the lack of artillery may be supplemented by indirect fire of infantry from behind parapets constructed to give several lines of fire. The Russians have given much attention to this use of infantry fire, and of their experimental firing with it in view, an interesting one was to determine the distance at which a man could stand upright, without being hit, behind a parapet seven feet high. With a Berdan rifle, the distance varied from sixty-nine feet, when the range was 220 yards, to 11.5 feet, when it was 1500. It is well to remember that the further the enemy, the narrower the zone of protection of the parapet; also that 1650 and 2000 yards respectively are considered effective ranges for rifles with cylindrical, or helicoidal bores.

Infantry combat; destruction of accessory defenses; assault. The attack well prepared, and the artillery fire of the defense subdued or considerably weakened, the assailant assumes his formation for battle. The French regulations of 1875 recommend that this be done at 900 yards distance; if the ground be level and exposed, it will be prudent to consider this a minimum, musketry fire being quite effective at even greater distance, and artillery fire of the defense, if some pieces be still in service, being at this distance extremely destructive. Moreover, it is not a question of at this distance, forming a line of skirmishers, with supports and reserves, but of dividing up groups so as to screen them from fire.

The troops thus formed advance by successive rushes; and the various *echelons* merged into a strong line of skirmishers, thus reach the accessories. This first body forms the so-called head of the column, and is composed of one or more companies, according to the extent of the work attacked.

To allow the position to be penetrated, the accessories must be destroyed, or at least gaps must be opened up in them. This work if not already done by artillery, will fall to a group of pioneers marching behind the head of column, and will be executed under the protection of the line of skirmishers, lying at the foot of the glacis, and keeping up a fire on everything appearing above the parapet. The implements of the pioneers will vary with the nature of the demolitions, and will consist principally of explosives, axes, crow-bars, saws, etc. While this task is being performed, the assaulting force is brought forward. A work is not to be carried by a skirmish line, however strongly it may be re-inforced; it is by an avalanche of men throwing themselves

the glacis, covers the work with as heavy a fire as he can and gives the reserve of the assaulting column time to arrive. This reserve, as large as the column itself, marching about 550 yards behind it, promptly brings the reinforcement needed for attempting a new assault.

If the work be taken, the assailant establishes himself at the gorge, covering himself as well as possible by utilizing all obstacles, and if necessary, throwing up earth. There must not be a moment's hesitation in constructing intrenchments for this purpose, if the gorge be under fire of works in rear. Of this we find many significant examples in the defense of the Turkish intrenchments of Plevna. Gen. Skobeleff reports that on several occasions the Russians were driven from works which they had just taken with the greatest sacrifices by the murderous fire of their antagonists established behind a second line of intrenchments. He speaks of the Russian soldiers seeking cover in such cases by all possible means, and to procure shelter, trying to throw up earth even with mess utensils.

In such cases, the assailant, however slightly inclined so to do, should use his portable tools; for directly after the bloody assault just completed there will be no delay in realizing the necessity of a few trenches, which may be thus rapidly built. At the same time, the material abandoned by the enemy must be destroyed or turned against him; mines and torpedoes prepared by him must be discovered and cut off. For this, a detachment of artillery with proper instruments will follow the reserve of the column and assist the pioneers.

The operations described will be directed against each salient attacked, by a force whose effective double or triple that of the defense will be subdivided as stated: 1st, a head of column, one or more companies; 2d, a group of pioneers, with a reserve, the numbers varying with the demolitions, required; 3d, an assaulting column—about half of the effective; 4th, a reserve for the assaulting column, of equal strength; 5th, a detachment of artillery, its strength varying with the works.

Still, precautions must be taken against the failure of this force, and especially must measures be taken to repel counter-attacks, which the defense will not fail to direct against its flanks. Consequently a grand reserve will be formed of a force almost equal to the sum of all the different assaulting columns. These troops will attack those trying to flank the columns, and will sup-

port those columns which may be repulsed. If the enemy has established continuous lines, they will make a direct attack upon those parts between the salients designated for assault; if not, they may assault the flanks and gorges of the works, and thus bring about their fall more rapidly; but evidently this means of entrance can be counted on only when the intrenchments attacked are isolated, or too far apart for effective mutual support.

The first line carried, the assailant passes in like manner to the attack of the second, then to that of the third, if it exist. Each attack must be thoroughly prepared by artillery; this preparation is essential to success, as has already been shown.

If the position have a citadel, the attacking force, after taking the first lines, must at once establish itself strongly. When the citadel is of some importance, it is first battered by artillery, which demolishes the work in which it is established, and, if possible, sets it on fire. The walls are attacked by pioneers provided with powder and dynamite, and supported by the head of column trying to block up embrasures, and to smoke out the garrison; when a practicable breach is made, the assault strongly follows.

Attack of very strongly intrenched works. The dispositions just given apply to the ordinary works of the battlefield, whose profile and armament are relatively rather weak. But there would be slight chance of success in operating in this way against works of more importance, powerfully armed and mutually strongly related, even were the assault prepared at great length by artillery. Still, the works of approach used before permanent works would be disproportionate to the time and resources available in the field. Is there then no mean between the two?

If there be no method which can be clearly formulated as a guide in like cases, we may at least consider the experience in recent wars, in which the case in question was presented more than once. In 1864, before the lines of Düppel, which were composed of a series of works of strong profile, connected by lines of intrenchments, the Prussians did not hesitate to employ trenches to a certain extent, to obtain cover against the defense. In 1877, at Plevna, Russians and Roumanians were alike obliged to have recourse to earthworks for protection against the fire of Turkish redoubts which they were attacking during the entire time required by their artillery to weaken that of the defense, a parallel having been constructed by the Roumanians but fifty-five yards from the Krivitza redoubt.

We are then led to conclude that the open attack must be abandoned in the presence of strong, well-armed works. Portable tools, with which infantry should be, and abroad is, provided, will play an important rôle in these cases. The forward movement of the attacking party must be covered as far as possible. Troops will advance during the night, and, while profiting by the ground when possible, construct a trench enveloping the enemy's intrenchments like a first parallel. Often this must be done night after night, so as finally to construct a parallel less than 200 yards from the work. Small approaches will give communication from one parallel to another, or an embankment or a sunken road will consolidate the successive positions of the assailant. While bearing a general resemblance to siege-works, profiles will, however, be weaker, and parallels irregular, as ground favors them.

The attack then resembles an assault, but heads of columns are covered behind the last parallel and have the advantage of converging fire. Sharpshooters are posted during the day opposite artillery epaulements. Parts of the last parallel are strengthened, so that assaulting columns may be massed behind them. Reserves occupy parallels in rear.

The grand phases of the struggle just described will doubtless continue to exist, but every important step forward will be marked by taking the ground with the aid of hasty works. Of course it may be difficult to fix the limits within which earthworks must be used, but it must be clear that in future this new element of attack must be taken into account. Fire-arms have to-day such power that, to escape complete destruction, it becomes absolutely necessary to gain cover one way or another when exposed to their fire for any length of time.

Before passing to the defense of field fortifications, I cannot let go unquoted Capt. Greene's report of Gen. Skobelev's remarks as to assaulting intrenched positions, remarks the more important coming from one who at Shipka stormed the Shenova lines in daylight, without artillery preparation, and receiving the surrender of 12,000 men, weakened the assertion made just after the close of our civil war, that a well intrenched line defended by two ranks of infantry, cannot be carried by a direct attack. The remarks are these: "The only formation in which troops can successfully assault intrenched positions, is in successive lines of skirmishers. The division-general must be perfectly thoughtless of his own comfort or safety, and put himself between the skirm-

ishes and his reserves, where he can feel the pulse of the battle, and have the troops in his own hand, and judge himself of the moment when the successive battalions in reserve should be put forward. There are in every command a small per centage of cowards who will slink away at the first opportunity; a certain number of men of rash bravery who will go forward too far, and get killed; and the great majority of men of ordinary courage, but liable to waver as the fight gets hot. The reserves must be sent in at the moment when the reasonably brave men have been long enough engaged, and have met with enough resistance to begin to feel nervous, but before they have actually begun to retreat; and it is in deciding upon the opportune moment for sending forward his reserves that the art of a division-commander consists."

Defense of field fortifications. The study just made of the plans of attack, allows the *rôle* of the defense to be readily marked out. First, clearly consider the situation. From a material point of view, the defense is better covered; he knows his ground, possesses ammunition in abundance, and easily renews his supply, and can make a very formidable use of his fire-arms. There is his great advantage. His artillery, on the contrary, can not be greatly extended; its fire is divergent, against converging fire of the enemy, finally he is outnumbered. From a moral point of view, he is inferior to his assailant stimulated by every advance; he can find compensation only in the sense of security inspired by his works, nothing must be neglected to develop this feeling.

To clearly define the *rôle* of the defense, let us take up in order the various periods of the attack, and point out what must be done in the different cases.

Reconnaissance of the position. Prevent the approach of the enemy by placing in advance of the works outposts of sufficient strength to repel demonstrations; conceal the works as much as possible by curtains of trees, foliage scattered over the slopes, and earth-covering of accessories. On the other hand, in unoccupied places, deceive the enemy by letting him see works, which may give him wrong ideas of the strength of the position.

Preparation by artillery. This will soon follow the reconnaissance. The most suitable emplacements for artillery are generally known in advance by the defense; then when the enemy is about to occupy them, let all batteries other than those held in reserve for decisive moments of the struggle, open a murderous

fire. They have the double advantage of being quite ready, and generally well-covered and installed; they must use it to delay as long as possible the enemy's artillery being brought into action. This, of course, can not be prevented, and soon the artillery engagement will begin. It must be vigorously maintained by all the batteries, with the exception mentioned, taking as objectives only those batteries of the enemy which appear the most threatening, so as to avoid scattering fire in the endeavor to reply to all at once.

Only at the last extremity, are these batteries to be withdrawn to emplacements prepared for them in the rear; well covered, as they must have been at the outset, this retreat of these guns will rarely be necessitated by artillery-fire alone of the attack. Then when the enemy advances, he will have these batteries to take into account, which casting aside all care for their own safety, will concentrate on him at least the greater part of their fire. The defenders of the works will add theirs, which must be as well maintained and distributed as possible, the knowledge possessed in advance, of the exact distance of the salient features of the ground over which the enemy must advance, should give this fire great power.

The most effective means of defense lie in the use of counter attacks. To this end special troops, forming a reserve, are directed against the flanks of the attacking column, and try to overwhelm it and throw it into disorder. They are supported by the fire of grape or canister, according to distances. These counter-attacks well-directed and often, cause confusion in the assaulting forces, stop their forward movement, and if they are executed properly and with sufficient force, may end in completely repulsing them. While they stop for the destruction of the accessories, and the assaulting columns advance, the defense must keep up as heavy a fire as possible, so as to cover the approaches of their position with a shower of lead causing severe loss to the enemy. Two moments are specially favorable for counter-attacks: one, when the enemy is about to pass the obstacles covering the work; the other, and the most favorable of all, when he commences the descent into the ditch.

If the assault be finally tried, the defense no longer seeking cover, mounts the slopes, fires at the assailants, and if they have penetrated the works, attacks them with cold steel. At this moment a well-directed counter attack may cause the assault to

fail, hence the defense should have prepared the means for executing it.

Should the enemy enter the work, every inch of ground must be disputed with him; shelter must be taken behind traverses and parados, and the struggle continued to the last to give troops in the vicinity time to come up and attempt a diversion. Should further resistance be impossible, in abandoning the work, all abandoned material must be destroyed, and all prepared mines and torpedoes fired; their explosion in the midst of assailants will produce great effect. It is enough to call attention here to the example of the Russians at Sebastopol, and the serious losses due to the explosion of such appliances, inflicted on the French, even when in the Malakoff.

As soon as the defense has abandoned the work just taken by the enemy, the works established in rear cover it with the fire of artillery and small-arms, to render its occupation very dangerous, and to prevent the enemy from establishing himself there. In the meanwhile, the defense re-forms and as soon as rallied in sufficient numbers, attempts offensive returns.

Military history abounds with examples of works thus lost and retaken again and again; and should success finally crown the efforts of the enemy, the defense, at least, has the consolation of having made him pay dearly for the defeat inflicted.

The task of the garrison of the citadel is particularly important; it must hold out to the last extremity, to protect the troops driven from the works in front, and to stop the enemy's pursuit. Its power to do this was exemplified at Kars, where occurred the most recent, successful assault. There, simultaneous attacks were made against twelve forts, and particularly against two. Intrenchments were penetrated without difficulty; but the Russians had great trouble in maintaining themselves there: notably at Fort Kanly in which a barrack formed a defensive redoubt sweeping the interior of the work with its fire. When seven of the forts had fallen, 300 men still held the redoubt, showing the value of such constructions in the interior of works not provided with ditches, and with scarps secure against escalade.

When the position defended consists of a line of intrenchments, the attack will have been made on one or more salients. Supposing these carried, their loss must not cause the entire line to be abandoned. The struggle must be prolonged by utilizing the accidents of the ground, and those portions of the line per-

pendicular to the general line, for directing a new attempt against the enemy and preventing his spreading over the entire position.

Strength of the defense. This should be estimated at two men per running metre of occupied crest ; this gives great density of fire while at the same time preserving a small reserve for each work. In defending a line composed of several intrenchments, a general reserve must be held for conducting counter-attacks. This reserve should equal in numbers, the force posted in the works. Some parts of the line need not be manned as strongly as others ; such are those where the enemy has slight chance of breaking through, on account of their situation, or of strong obstacles with which they have been covered. Here one man per running yard will suffice. For example, in continuous lines all salients, and curtains adjacent to them will be strongly occupied ; other parts will be simply watched.

If there be two successive lines, each of them may receive a special garrison, although it would be reasonable to assume that the garrison of the second line must be composed in part of troops driven from the first.

To sum up, an average of four or five men per running yard for an entire defensive position of two lines, will suffice for the garrison of the works and the necessary reserves. A good defense of the work can be assured only by the existence of these reserves. We have seen what an important *rôle* is assigned to them, and how counter-attacks conducted by them may defeat the enemy. Their importance is so great that it has been said that a field-work cannot hold out if reduced to its own resources only. This opinion of the Austrian, General von Geldern, in support of which he cites the capture of the isolated redoubt of Montretont, defended by German chasseurs, Jan. 19, 1871, might perhaps seem exaggerated if we consider the example of the defenders at Plevna, who showed what an energetic defense could and should be. Still the case cited by Gen. von Geldern, shows that good reserves should be established whenever the strength of the forces permits.

The defense of an intrenchment once successful, it must be borne in mind that its defenders are not to remain anchored behind the parapets. The work must serve only as a point of support, whence the offensive must be boldly assumed, when the strength of the enemy has been broken, and at any other favorable moment.

In conclusion, it is desired to call attention to the following subjects which merit our general study:

The modifications of field and siege-works, rendered necessary by modern artillery;

The modifications of siege-work necessitated by modern small-arms, to be used in the attack of field, and semi-permanent-works, other than by regular approaches;

The need of a portable intrenching tool as part of the regular equipment in time of war, of some fractions of regimental or company organizations;

The possibilities of our army rifle, in volley firings at long ranges;

The use of high explosives, both for charges of projectiles, and for demolitions;

The use of curved fire against fortification work of all classes, and in the defense of such work.

MILITARY TRAINING IN COLLEGES.

BY LIEUT. A. C. SHARPE, U. S. A.,

TWENTY-SECOND INFANTRY.

"Military virtue is not the growth of a day, nor is there any nation so rich and populous that, despising it, can rest secure."—NAPIER.

"None make better soldiers than those who are transplanted from the region of letters to the fields of war; never scholar became soldier that was not a good and brave man."—CERVANTES.

THE true military policy of a nation, as enunciated by philosophical students of the Science of War, should grow out of the spirit and genius of the people, and be in harmony with all its institutions. If, therefore, a practicable and effective military policy is to obtain, it is of the first importance that a military spirit should prevail among the people, and be judiciously fostered by the State. Probably no nation in the world has better material for soldiery than America, yet in our long intervals of Peace, overflowing with the abundance of prosperity, we speedily forget the difficult lessons of War, and fall to dreaming with Kant and Burritt and Bluntschl of that beatific day when the spider shall weave a curtain over the cannon's mouth and the bullet shall rust on the beach. But as De Tocqueville has warned us, "War is an occurrence to which all nations are subject, democratic nations as well as others; so long as human passions continue to influence the actions of men, wars may be expected to arise and resort be had to the sword to cut the knot which diplomacy cannot untie."

The importance of keeping alive a military spirit among the people, and of training the youth in the elements of War, is always more clearly recognized at the close of a great conflict. Its necessity had certainly become a very decided conviction in the minds of Washington and his ministers at the end of the Revo-

lution. He had been in the Executive Chair scarcely nine months, when, on the 21st of January, 1790, he laid before Congress an elaborate report from Secretary of War, Knox, upon a plan for organizing the militia, in which the Secretary says: "All discussions on the subject of a powerful militia will result in one or the other of the following principles: First, either efficient institutions must be established for the military education of the youth, and that the knowledge acquired therein shall be diffused throughout the community by means of rotation; or, secondly, that the militia must be formed of substitutes, after the manner of the Militia of Great Britain." Two years later Congress passed the Militia Law, but no provision yet being made for the military education of the youth, the President again made a more urgent and pointed recommendation, and in a message to Congress in 1796, his last year in office, he again wrote: "However pacific the general policy of a nation may be, it ought never to be without an adequate stock of military knowledge for emergencies." Washington did not live to see the accomplishment of his wise design, but his sagacious utterances were not forgotten, and after some further delay and deliberation, Congress finally, in 1802, established the National Military Academy at West Point. Probably no institution in the world has fulfilled its purpose better, but the object to be attained in such schools, as understood by the fathers, and as enunciated by General Knox, was not only the education of a selected few, but "that the knowledge acquired therein shall be diffused throughout the community." It was designed to institute, if possible, a system of popular military education, which should be within the reach of every boy in the land. The subject of National Defense excited a protracted debate in the Tenth Congress, the outcome of which was the Militia Law passed in 1808, and which remains with many obsolete and absurd requirements on the Statute Book to this day; but no further provision was made for the military training of the youth, and the matter was allowed to rest till the second War with England once more compelled the attention of the federal law-makers to its importance. Shortly after the termination of that conflict, several committees were appointed in successive sessions to consider the subject. A report was finally brought into the House in 1817, wherein the committee declared that "there can scarcely be a restraint more vexatious and disgusting to a grown man than the initiatory lessons of the military art, and that to establish a sound military

system we must begin with the youth of the country; that we ought therefore to devise a system of military instruction which shall be engrafted on and form a part of the ordinary education of our youth, extended without exception to every individual of proper age, not in distant schools established for the purpose, but that it should form a branch of education in every school within the United States."

Notwithstanding these and similar earnest recommendations, the public mind was not yet sufficiently impressed with the expediency of the plans proposed; and although the subject reappeared at intervals with spasmodic energy, nothing was done by Congress, looking to a more general dissemination among the people of the knowledge acquired by the national cadets. The Military Academy had been in existence nearly sixty years when the Civil War arose, yet so circumscribed had been the range of its influence, owing in a measure to the vulgar hostility to the Institution itself, that military ideas had degenerated into unreasoning opposition or stupid indifference. The Army and the people were strangers to each other, cadets were denounced as "wasp-waisted vampires," and the uniform of a Regular was still regarded with the old time disfavor. A distinguished Artillery officer of more than forty years' service, referring to this deep-rooted prejudice, said, "I was born, I believe, with a good catholic heart; I love my fellow-man, no matter what uniform he wears or with no uniform; I always look upon a man as my brother and I never try to belong to a class; I am not a partisan either in politics, religion, or anything else; I try to avoid it; and nevertheless, somehow or other, notwithstanding the catholicity of behavior and manner which I have tried to cultivate, I do find that my uniform is not the best introduction to the hearts of my fellow-men."

This spirit was manifest both North and South, everywhere obstructing the way and opposing the necessary forms, discipline and official etiquette so indispensable in the business of War. General McClellan writing from Washington under date of August 15, 1861, says, "The great trouble is the want of officers of regiments. We have good material but no officers." This was the experience of every commander in the first years of the War and served to prolong the period of preparation to an almost fatal point. Colonel Suydam, Chief of Staff to General Keyes, writing of his own helpless condition, observes: "I had entered

the Army from my lawyer's desk utterly ignorant of anything pertaining to the Service, and after three months diligent application had tolerably well familiarized myself with the duties of a lieutenant of cavalry!" Three months, every day of which was worth millions to the Government, spent in elementary instruction! Time enough lost in getting ready to have made a vigorous and decisive campaign. Statesmen again began to think of General Knox's plan and to ask themselves, why should not the boys be able to learn along with their Latin and mathematics and Greek some of the practical lessons of a soldier's life—respect for authority, fidelity to duty, official courtesy, and the various duties of the sentinel, the corporal and sergeant, and, perhaps, of the lieutenant and captain?

The tumult of War had scarcely died away, when on December 6, 1865, the National House of Representatives on motion of Mr. Cullom of Illinois, adopted the following:

"*Resolved*, That the Committee on Military Affairs when appointed, be instructed to inquire into the expediency of establishing a National Military School in some of the States of the great Northwest."

One month later a bill was introduced in the House to educate the Militia, and on January 29, 1866, Senator Sherman presented a bill in the Senate to promote military education. Several other measures similar in character were proposed, all evincing a determination on the part of Congress to devise some practicable method for the more general and systematic training of young men. The first effort to introduce military education into colleges was a bill brought in by Mr. Lynch of Maine, on April 19, 1866, providing for such instruction in Agricultural Colleges established under the act of July 2, 1862. Finally, on May 16, of the same year, Senator Henry Wilson introduced a bill "to increase and fix the Military Peace Establishment of the United States." This bill passed both Houses and became a law by Executive approval on the 28th of the following July. Section 26 of this Act reads as follows:

"That for the purpose of promoting knowledge of Military Science among the young men of the United States the President may, upon the application of any established College or University within the United States with sufficient capacity to educate at one time not less than one hundred and fifty male students, detail an officer of the Army to act as president, superintendent

or professor of such college or university; that the number of officers so detailed shall not exceed twenty at any time and they shall be apportioned through the United States as nearly as practicable according to population, and shall be governed by general rules to be prescribed from time to time by the President."

No provision being made by this statute for arming or equipping the students, their instruction, where arms could not be procured, must have been principally theoretical. To cure this defect a joint resolution, introduced by Gen. Schenck in March, 1870, was adopted in the following month, and became a law by the President's approval on the 4th of May. This resolution authorized the Secretary of War "in his discretion to issue such member of small-arms and pieces of Field Artillery as may appear to be required for practice and instruction of students of any university under the provisions of the Act of 1866," above referred to.

From May 4, 1870, therefore, we may properly date the present system of Military Training in Colleges. The seed which the fathers had sown at the birth of the Republic, had lain in the unfriendly soil quite lifeless, until the blood of Civil War, poured copiously upon it, induced its tardy germination.

The system thus inaugurated was not, however, without opposition, being denounced by Wendell Phillips as "a harmful and unchristian innovation." It nevertheless rapidly grew in favor with less dyspeptic educators, and the demand for military instructors soon exceeded the authorized supply. To meet this demand, Congress has several times increased the number of officers available. By an amendment approved July 5, 1876, the number was increased to thirty, and by an Act of May 4, 1880, just ten years after the adoption of Gen. Schenck's resolution, it was provided that any officer of the retired list may be detailed for this duty. Finally, on July 5, 1884, the number available from the active list was raised to forty—its present limit.*

* A bill to increase the number to fifty was introduced by Senator Manderson last winter. The Committee on Military Affairs in reporting it back say: "The substantial good that has been derived by the State universities and public colleges of the country from the detail of officers of the Army to act as military instructors is very great, and the observation of all who have come in contact with these institutions, shows the fact to be that the detail should be increased with the growing wants of the country."

General Sheridan and the Secretary of War also gave their endorsement to the proposed increase, but the bill was reported back too late to reach final action before adjournment.

This is briefly the history of legislative and official action with reference to this important feature of public policy. The system has now been in effective operation for seventeen years; the results attained, although already apparent in the improved bearing and demeanor of the young men who have come under its influence, in the more intimate and cordial relations between the Army and the people, and in the steady growth of a true national military spirit, can only reach their ripe fruition when the Nation shall again be called to arms. Twenty-seven States are now supplied with instructors, and according to recent official data, there are annually under military training from four to six thousand students. We may safely estimate no less than ten thousand active young men scattered over the country who have thus received from one to five years' discipline in the elementary principles of the Military Art. In case of War a large proportion of these would be found efficient company commanders, and "the company," to borrow the words of General Sherman, "is the basis of all good armies." This preliminary training will then prove of immeasurable advantage in speedily organizing and disciplining the new troops, and the work of mobilization—an art as yet little known on this side the Atlantic—would not be protracted, as in 1861, through weeks and months of painful anxiety and countless cost.

Besides its value as a measure of State policy, military drill in schools possesses positive advantage as an effective mental and bodily discipline, and where judiciously distributed may be made to present an agreeable variety to the sedentary occupations of the student.

The system of instruction prevailing in the various institutions should be, in general outline, the same. That which is in operation in the University of Wooster, Ohio, where the writer is on duty, is here briefly indicated.

The course covers seven years. The Junior Preparatory Class is excluded from military exercises, owing to lack of arms, but is provided with a teacher of gymnastics, who devotes some attention to the "setting up" exercises and to fencing. These exercises cultivate the indispensable habit of attention and develop the muscles of the waist and abdomen.

The pupil is thus being prepared to enter upon the more rigorous training he is to receive in the following years. The remaining classes are *required* to attend the prescribed exercises

of the Military Department, until they reach the last year of their collegiate career when they are permitted to elect "gymnasium" or "military." A student who remains at the University through the entire course, thus receives five years of military instruction. All are required to appear, when on duty, in the uniform of the United States Army. The students are organized for practical instruction into an Infantry Battalion, a Battery and a Signal Corps. The Battalion has a complete regimental organization including Field and Staff, a band of twenty pieces and seven companies, aggregating about 190 men. The Junior Class are the cannoneers of the battery, and the Sophomores constitute the Signal Corps. Commissioned officers are chosen from the Senior Class, and non-commissioned from the lower classmen. A guard of six or eight posts is regularly mounted, the officers of the guard being held strictly accountable for the proper instruction of sentinels and the rendering of a correct guard report. Six copies of the Army Regulations are found in the University library, having been furnished by the Adjutant-General of the Army for the instruction of the young soldiers. Great care is taken to throw the responsibility of instruction upon the officers themselves, captains and officers of lower grade being required to drill their own companies and squads; the Battery and Signal Corps likewise having their proper officers in the uniform of their respective arms, and all being required occasionally to take the place and discharge the duties of the Adjutant or of one of the field-officers. The Commandant instructs the officers in the manual of the sword, in broad-sword and sabre exercises, and with the foil according to the system of M. Corbesier, sword-master at the U. S. Naval Academy. Two rifle teams compete at target practice, adhering as closely as possible to the Manual of Colonel Blunt—the ammunition for this purpose being furnished in limited quantity by the Government, and the shells reloaded at a trifling expense by the teams themselves. The officers recite in tactics and attend a course of lectures delivered by the Professor of Military Science during the year upon the principles of modern gun construction, the rifle trajectory, the permanent angle of drift, and kindred subjects in ordnance and gunnery; the elements of international law and the law of War, military law and the procedure of courts-martial; the organization of modern armies, the science of the staff, marches, castrametation, reconnaissance, outposts, battle intrenchments, the

principles of strategy, etc., etc., illustrated with models, maps, and diagrams. The pupils manifest great interest in these lectures, and are encouraged to ask questions and to cultivate a taste for military literature. At the conclusion of the lectures on law a moot court-martial is held, affording a practical illustration of the principles involved, besides being a popular occasion of much merriment and a severe test of the gravity of the judges. The members of the local bar, National Guard, and others are invited to be present at these exercises, which thus become a further means of familiarizing the people with military manners and customs. The Professor of Military Science and Tactics is a member of the Faculty, enjoying their cordial co-operation and support in the discharge of his duties.

The vital principle of every military system is Discipline. "The great aim of drill," says Lord Wolseley, "should be to discipline not only the body but also the mind. A student describing his experience recently, argued, "I don't like it. It requires such close and constant attention!" Exactly. Drill begets habits of fixed attention to the business in hand, and thorough discipline is the perfection of habit. This discipline cannot be drilled into a recruit in an hour or a day, but "must be the gradual growth of his military career." It must be learned in the company and in the battalion where "men are accustomed to act together, mutually reliant, trained to perform in unison the movements best suited to the march and the battle." This indispensable quality, so tedious and difficult of attainment, may nevertheless be acquired in a high degree by a college battalion.

The requisites to success in this direction appear to be:

- 1st. A zealous instructor.
- 2d. Compulsory attendance of every able-bodied student at the prescribed exercises.
- 3d. A simple, inexpensive uniform, preferably that of the United States Service. It is plain, neat, and appropriate for all occasions.
- 4th. A proper system of demerits for minor breaches of discipline, and
- 5th. The careful and constant inculcation of generous and soldierly sentiments of personal honor, respect for authority, and reverence for the colors. The most potent agency for the development of these ideas is found in the simple act of saluting. The student-soldier should not only acquire the habit of saluting

his fellow-students with dignity and ease, but should be taught to lift his cap on every proper occasion in silent homage to the flag.

If these principles be adhered to, we may confidently anticipate the steady growth of military virtue, an educated and efficient National Guard in every State, a more liberal spirit in military legislation, and, in case of mobilization for War, an incalculable saving of time—that precious element in strategy which neither gold nor genius can command.

FIELD-ARTILLERY CARRIAGE CONSTRUCTION,

By CAPTAIN OTHO E. MICHAELIS, U. S. A.

ORDNANCE DEPARTMENT.

COAST DEFENSE has within the past few years been the all absorbing military theme.

Engaged in the discussion of plans and methods for fabricating heavy armament, we have had apparently little time at our disposal to consider Field Artillery construction. Yet we must not forget that in the decision of a battle, the small caliber gun, to the almost entire exclusion of its giant descendant, offers the most convincing argument.

Aside from the teachings of the well-known school maxims, we have seen a great War decided by an unquestionably better Artillery opposed to a better-armed Infantry. It is hardly necessary to point out that favored as is our geographical position, we are not entirely safe from land attack, and that should occasion demand, the invader must be met in battle, and to insure success we must have a well-equipped Field Artillery. Hence the topic of to-day, though rather overshadowed by the cry for 100-ton rifles and dynamite projectiles, is not unworthy of your brief consideration.

It is not my intention to read a complete paper; I have simply a few ideas to present, evolved from a little experience, from conversations with those who know more than I do, and from a good deal of consequent, I borrow the expression of a former officer of my corps, "laborious introspection."

For the past two years and a half, my station has been Watervliet Arsenal, and during that period I have had some little opportunity of observing the drift of Artillery thought. To-day my object is to endeavor to embody this tendency in practical

construction, combining with it such other "notions," as have come to me after nearly twenty-five years of extended observation. I leave it to you to decide whether these "notions" be mere fanciful idiosyncracies, infeasible theories, or if they be deserving of further consideration.

In the latter case, I ask advice and suggestion, founded upon your experience and observation, as to the way in which they may best be transferred from the realm of thought to the field of practice.

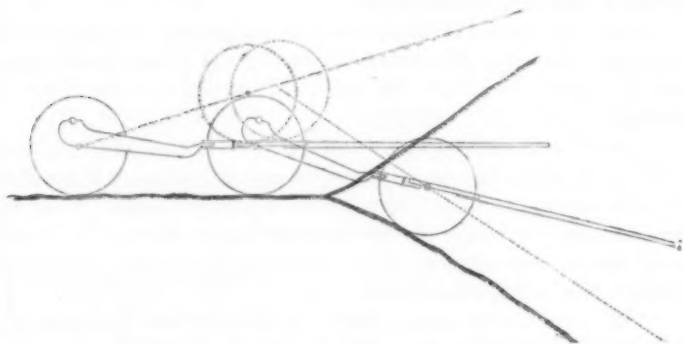
I considered it would be less formal to treat the subject to-day precisely as it was developed in my thoughts, following if possible the same mental processes that led to my conclusions. You will then see that the whole matter logically results from a few conditions, whose necessity, in these closing years of the nineteenth century, you will not question.

With this introduction, brief, explanatory and apologetic, I plunge hesitatingly *in medias res*.

Artillery officers, in late years, have said much regarding the ill-effects upon their horses of the vertical "thrashing" of the pole; various ingenious methods have been proposed for the amelioration of this evil, every one of which seeks to hamper the operation of the cause that makes the thrashing possible, yet not one of the inventors has boldly stated what this cause is.

Usually, nay probably, for over ninety per cent. of its active life, the combined gun-carriage and limber is simply a four-wheeled wagon adapted for the transportation of its load, the gun and ammunition. Now, nowhere but in the Artillery Service, can a four-wheeler be found of such construction. It differs in two essential conditions from every other vehicle of its kind. It has a flexible reach and a rigid pole. In all other wagons the connection between front and hind wheels is fixed, and the pole is hinged. In this method of construction, you have the cause of vertical thrashing, a complaint incident only to the Artillery Service. To prove this: in passing over rough ground, there is a constant, conforming working of the reach hinge, the lunette and pintle-hook joint, a scissors-like opening and closing, transferred of course in an increased ratio, to the end of the pole, with a resulting intermittent variable pressure upon the withers. This cause has been unconsciously recognized, for all attempts to lessen the thrashing have been in the direction of stiffening the reach.

In one case this has been successfully accomplished; but the projector forgot that a rigid reach required a hinged pole, consequently, as you see, going down the hill, gun-carriage wheels, going up hill, the limber wheels, are in the air. The pole cannot be



hinged and the reach flexible, for in such case there would be no stability in the limber body: it would constantly oscillate about its axle. Therefore, to overcome thrashing, you must have a rigid reach and a hinged pole. Were this the only requirement, the solution, as you see, would be simple. (A model was here shown by the lecturer.) Here you have a field-carriage with fixed connection between front and hind wheels and with a pole, moveable in a verticle plane. In this construction there can be no injurious thrashing. Unluckily, this by no means solves the main problem.

To enable us to do this, we must establish the conditions that an Artillery carriage must possess, and these I will state, for the moment, without regarding tactical considerations:

1. It must be a suitable gun-wagon, well adapted for its load, that is, this load must be hauled with a minimum of discomfort to the horses.
2. It must admit of simple, almost instantaneous conversion or dismemberment into a gun-carriage, a suitable structure upon which to fire the piece, and a limber or cart, for the immediate supply of the necessary ammunition.
3. It must admit of as ready assembling, to form again the gun-wagon.
4. It must be able to adapt itself readily to unevenness of ground, and

5. It must have some facility of turning.

Thus far the first condition only, has been met; we have, what appears to be a suitable gun-wagon.

The general lunette and pintle-hook connection has in its favor the fact that it has been used for centuries, and to displace or to change it, it is incumbent upon the proposer to show that his substitute possesses all its advantages and is free from all its disadvantages.

What are its advantages? It is a universal joint within limits, consequently our gun-wagon, not provided with springs, can in a measure, adjust itself to the requirements of unfavorable terrain. It admits of ready unlimbering and limbering, and it has a turning angle of about 48° to 50° . It therefore fulfills all our conditions except the first. Let us examine how the proposed construction meets the other conditions.

Unlimbering and limbering is accomplished by the removal or insertion of a pin; in action or in manœuvring, a still simpler method is provided, first suggested by Lieut. Gordon of the Ordnance, the lunette is slipped off or on the head of the pintle pin. This method of construction admits of at least as great a turning angle as in the standard carriage. Adaptation to vertical movement is provided for by hinging the pole, an entirely new attribute. Adaptation to varying horizontal movement between front and hind wheels in marching, has been secured by abolishing the time-honored pintle-hook, and substituting a cylindrical steel cast "drawhead," suggested by well-known railway practice, free to revolve to any desired degree. The manœuvring connection is flexible, hence, it must have a rigid pole, which is obtained by slipping into bearing a very simple pole-lock. A rigid pole is also required when the limber is detached. We have then evolved a theoretical carriage that fulfills all required conditions, some of which, apparently, the old construction can never meet.

We come now to modern tactical requirements, and we will see that the standard construction as a unit is not up to the military spirit of the age.

Mobility is the cardinal requirement of modern campaigning. The panoplied knight, and the fixed gun, the heavy dragoon, the knapsacked infantryman, the 1600-lb field-piece, have in succession passed away forever.

Those who have seen our Indian scouts prepare for action will understand my meaning when I say, that the tendency of

modern warfare shows a reversion to ancestral traits; we also *strip*, metaphorically, of course, for the fight. We will presently examine whether or not the Artillery has kept apace with the Infantry in conforming to this pruning for active service. At present we will confine ourselves to the mobility of the carriage.

Everything else being equal, this is a function of the turning angle. Sometime ago, a distinguished Artillery officer, who has studied his branch under many suns, told me that he wanted a carriage that would turn on its own ground. I have not succeeded in reaching this goal, but you have before you a carriage that has more than double the turning angle of the old construction. I could not make the limber wheels smaller, principally because it would bring the axle too near the ground. Under-cutting is not feasible on account of resulting complexity of structure; therefore I made the drawhead, the old pintle-hook, long. But this, to avoid inordinate weight, needed vertical support. I accordingly applied a truss, as seen in the model. Of course the details may be varied; there is no doubt however, but that sufficient support can be obtained with due economy of weight.

A peculiarity, though not an essential one, of the drawhead, is its sliding motion by which, in emergency, the turning angle is still further increased; this motion compresses a spiral spring, which acts as a buffer, prevents injuring the trail in quick turns, and may also serve to relieve the horses from sudden strains due to obstructions. On the march, the action is restricted by lock-chains. No fear need be entertained regarding its working, for the making of spiral springs is so far advanced, that railroad coil springs have been in constant service for over five years without change of "overall."

My trussed structure, of course, interfered with the carriage of that time-honored receptacle, the limber-chest, and I, naturally, considered if it were *necessary* to carry this elaborate ammunition receptacle.

It *was* a necessity when soft wood sabots would swell if wetted, when powder of low density and poor incorporation would simply "fizz" after exposure to moisture; but all our conditions are now changed, our projectiles are all metal, and our powder is so dense, so mechanically well-made, as to be almost moisture-repellant. Besides, the modern process of water-proofing paper enables us to replace the ancient "cap" with an absolutely water-tight covering, easily removable, in no way retarding the

use of the cartridge. I therefore dispense with the ammunition chest.

In these days of the direct application of means to ends, there appears to be no good reason why there should be two packings of ammunition between the Arsenal and the battery. I have therefore adopted an ammunition packing-box holding three rounds, closed by a device due to Colonel Williston. The cartridges, as you see, are inclosed in water-tight coverings, easily torn off, and harmless if left on. The weight of this box filled, about fifty pounds, is not too great for a man to handle, and, with a suitable sling provided, it might supersede the use of the gunner's haversack.

Sixteen of these boxes, weighing less than the walnut, and less than *half* the metal chest, holding forty-eight rounds (more than most modern chests) are easily carried on the limber. They can be securely lashed, just as any other load would be, for which purpose cleats and eyes are provided.

Here is one of these boxes full-size, and here you can see the sixteen, one-quarter size, stowed on the limber.

It is a curious illustration of the persistence of an old idea that even now, the world over, we should take unnecessary, hampering precautions, for the fancied security of metal and powder, hardy gun-fodder, while sensitive rations, men's food, are carried in "original packages." After all, the amount of ammunition that is transported ready for use under the standard system during a campaign, is limited; the reserve supply is carried in ammunition-boxes, more exposed than the one before you, for here the cartridge has, at least, a water-proof covering. Yet no objection is raised to this method.

A single battle may exhaust the limber and caisson supply. At Murfreesboro, Rosecrans' 129 guns, some of which were captured early in the action, expended 20,307 rounds, an average of 157 per gun.

Many of us can recall the field ordnance trains of our War, the tons of artillery ammunition in ordinary packing-boxes stacked without adequate shelter at our field dépôts, yet no inconvenience resulted.

Hence, our own experience justifies us in asserting that the only sound reason for the retention of the limber chest must lie in the facility it offers for the prompt handling of the ammunition.

If, then, a packing-box can be devised that possesses this same

quality, its last *raison d' être* disappears, and thereafter the chest should be found only in the museum.

The box before you appears to be as accessible as the limber chest.

Having abolished the limber chest, and our new ammunition boxes, aside from possible variations in their number, when properly stowed on the limber, being rather high for the average leg below the knee, I had to provide a cannoneer's seat.

I found I could do this by utilizing the space occupied by the foot-boards, and thus gain two capacious receptacles. For foot-rests, I add a metal rod-fender. The construction is shown in the model, and here is one of these receptacles, full size.

What shall they be used for? Let them replace the battery-wagon and forge. It appears to me that everything necessary for an active modern campaign can be carried therein. The battery-wagon and forge, again, are the relics of an age that is past.

In our day of short, sharp campaigns, the commander of the tactical unit cannot be charged with the refit or recuperation of his command during active operations. He is responsible for its offensive equipment.

The providing of supplies, of opportunities for rehabilitation, is the function of the Commanding-General.

An Infantry captain takes his company into the field, armed and equipped for action; he leaves behind his box of cleaning material, his reloading tools; he *strips* for the fight.

A Cavalry captain takes his troop into the field, armed and equipped for action; he renounces the convenient smithy, the well-stocked saddle shop, carries some fitted shoes, needles, thread, in his saddle bags, *he strips* for the fight.

Why should not the battery commander do likewise? I desire to be distinctly understood that I refer only to the *field* outfit of the battery. At posts, I would have cameras, dynamos, chronographs—anything I could get, that would amuse, instruct, improve.

What is carried in the battery-wagon and forge? Here is the latest catalogue of the contents. (See Appendix.)

Only an expert should criticise, a man of average intelligence may endeavor to analyze.

(Here the lecturer described in detail the possible uses of some of the various tools and stores on the list.)

Together they constitute a peripatetic arsenal. Convenient,

for the battery commander is not dependent for the supplying of his wants, nay, useful, for occasions may arise when some or all of these "contents" may "come in" handily, but—is it War?

If all these things may be needed in the field, it cannot be the duty of the battery commander to provide or to carry them in an active campaign. He is a combatant; he fights his command. Some one else must be responsible that he got what he needs. With equal logic he might insist on carrying all the rations and forage he might require, or consider needful, for the entire campaign.

I related to an Artillery officer of distinction, the fact that a battery-wagon issued fully stocked from Watervliet Arsenal early in the War, had been returned in 1865, after years of active field service, with the original packages of paints, oils, etc., unbroken.

"We had something else to do in those day," he responded.

This gives point to *my* point, my claim, that in an active campaign, artillerymen have "something else to do" than to use the tools and materials on these lists.

I have tried in vain, by diligent questioning, to find out what were the supposed need of carting through a vigorous campaign an unwieldy blacksmith shop. Fitted shoes can be carried, indeed according to English reports, "cold shoeing" is a success.

Patent wheels require no tire setting, or only at very long intervals; standard bolts and nuts always fit.

Should a three-inch axle break, the gun-carriage is useless unless you replace it, for no field "weld," even if practical, could stand the "crush" of 3-lb. charges.

The quality of all materials used has so improved in late years, that we can assume a certain life for everything. There is no need trying to provide for improbable contingencies; still, if a forge be insisted upon, a rotary-fan miner's forge with a capacity for welding two inches has lately been so modified by Colonel Whittemore, that with all the necessary tools, I have packed it in one of these limber closets.

It weight is 62 lbs.; with tools, 82½ lbs.

I would like to present one more consideration to my brethren of the Artillery.

At present the battery-wagon and forge consume one-third the battery effective; suppose they were replaced by two guns and carriages, would not the resulting six-gun battery be, even under the most untoward circumstances, an efficient four-gun battery?

That is to say, consolidate all this repair and reserve provision into two guns that might replace disabled ones. Would not twelve limber boxes hold all the tools and stores absolutely essential in a campaign?

APPENDIX.

TOOLS AND STORES TO BE CARRIED IN THE BATTERY WAGON.

WHEELWRIGHTS' AND CARRIAGE MAKERS' TOOLS.

- | | |
|---|--|
| 4 Augers with patent handles, $\frac{3}{4}$, 1, $1\frac{1}{2}$, and 2-inch. | 2 Gouges, framing, handled, 1 and $1\frac{1}{2}$ -in. |
| 1 Auger tenon adapted to the mortise of the wheels. | 1 Grindstone, 14x4 inch. |
| 12 Awls, brad, assorted. | Arbor, crank and stand for grindstone; the frame to be made so as to take apart and pack flat. |
| 2 Awl handles, patent for above. | 1 Hammer, claw-handled. |
| 1 Awl scratch. | 1 Hatchet, claw-handled. |
| 1 Axe broad (handled). | 1 Mallet, carpenter's. |
| 1 Bevel square. | 1 Oil stone, $1\frac{1}{2}$ lbs. |
| 1 50 foot tape measure. | 1 Oil Dropper, pint, brass. |
| 1 Brace, hand, metal, patent. | 1 Pincers, small. |
| 24 Bits for brace, hand-assorted. | 1 Plane, for, $2\frac{1}{2}$ -inch double irons. |
| 3 Brace extensions for above 6, 12, and 15-inch. | 1 Plane, jack, $2\frac{1}{2}$ -inch double irons. |
| 1 Chalk line on spool. | 1 Plane, smoothing. |
| 2 Chalk, lbs. | 2 Plane irons, $2\frac{1}{4}$ -inch. |
| 4 Chisels, handled, firmer $\frac{3}{4}$, 1, $1\frac{1}{4}$, and $1\frac{1}{2}$ -inch. | 1 Rule 2-inch, four-fold. |
| 5 Chisels, handled, framing $\frac{1}{2}$, $\frac{3}{4}$, 1, $1\frac{1}{2}$, and 2-inch. | 1 Rasp, wood. |
| 1 Compass, spring. | 1 Saw frame, complete. |
| 1 Drawing-knife. | 6 Saw frame blades, assorted. |
| 12 Files, hand-saw $4\frac{1}{2}$ -inch. | 1 Saw, hand, cross-cut 26-inch. |
| 2 Files, wood, flat, 10-inch. | 1 Saw tenon, 14-inch. |
| 2 Files, wood, half round, 10-inch. | 1 Saw, cross-cut, handled, 5-inch. |
| 2 Files for cross-cut saws. | 1 Saw set, patent. |
| 1 Guage, carpenter. | 2 Screwdrivers, 6, 12-inch. |
| 6 Gimlets, assorted. | 1 Screwdriver for brace, hand. |
| 3 Gouges, firmer, handled, $\frac{3}{4}$, 1, and $1\frac{1}{2}$ -inch. | 1 Square, trying, $7\frac{1}{2}$ -inch. |
| | 1 Spoke shave. |
| | 3 Screws, gross, assorted. |
| | 1 Vise, bench, wood, complete (iron screw). |

MISCELLANEOUS STORES.

- | | |
|----------------------------------|---------------------------|
| 6 Gas checks for gun. | 1 Lifting jack, (lights.) |
| 6 Lanyards. | 2 Reaping hooks. |
| 6 Lanterns, Hurricane, kerosene. | 6 Side lines. |
| 5 Oil, kerosene, gallons. | 2 Wheel traces. |
| 75 Grease, wheel, lbs. | 2 Lead traces. |
| 25 Nails, 4, 6, 8, 10 p.-lbs. | 20 Whips. |
| 6 Spokes. | 6 Collars. |

- 16 Hair Cinchas.
- 6 Bridles.
- 12 Halters.
- 25 Hame straps.
- 12 Halter chains.
- 20 Nose bags.
- 6 Sash cord pieces.
- 5 Marline, lbs.
- 1 Elevating screw.
- 1 Hames, pair.
- 2 Hole pads.
- 1 Leg guard.
- 2 Tompions.
- 2 Single-trees.
- 1 Sight, telescopic.
- 1 Sight, ordinary.
- 1 Sight, muzzle.
- 1 Odometer.
- 5 Cotton waste, lbs.
- 1 Ordnance Manual.
- 5 Sets, Knives, Forks, Spoons, Meat Ration Cans and Haversacks and Tin Cups.
- 1 Pole yoke.
- 6 Priming Wires.
- 3 Gunners' gimlets.
- 3 Vent punches.
- 4 Rammer-heads.
- 4 Sponge-heads.
- 6 Sponges.
- 6 Sponge covers.
- 25 Curry combs.
- 6 Horse-covers, canvas.
- 25 Brushes.
- 10 Spurs and straps.
- 20 Surcingles.
- 25 Blankets.
- 5 Paint, Olive, mixed in oil, lbs., to be packed in 1-lb. cans with screw tops.
- 2 Paint, black, lbs.
- 2 Oil, Linseed, raw, gallons.
- ½ Oil, Linseed, boiled gallons.
- 1 Turpentine, spirits of, gallon.
- 6 Brushes, paint, assorted.
- 2 Sash tools, assorted.
- 5 Sand paper, assorted, quires.
- 3 Cloth, Emery, assorted, quires.
- 5 Cloth, Crocus, quires.
- 25 Tripoli, papers.
- 2 Rotten Stone, lbs.
- 2 Oil, sperm, gallons.
- 4 Oil, neatsfoot, gallons.
- 10 Oil, harness, Collins, prepared, gallons.
- 20 Soap, Castile, lbs.
- 10 Sponge, lbs.
- 1 Mattock.
- 1 Spade.
- 2 Logwood, Extract, lbs.
- 2 Lampblack, lbs.
- 50 Grease, wheel, lbs., to be issued in 2-lb. cans with screw tops.
- 1 Gauge for fitting bits to horses to consist of a graduated mouth-piece, and one adjustable check-piece.
- 1 Steven's Combination Rule for each piece.

Note: 2. That in addition to above tools and stores, the Board requests that the Ordnance Department add such other tools and stores as may be required for the repair of the iron carriage furnished.

TOOLS AND STORES TO BE CARRIED IN FORGE.

BLACKSMITHS' TOOLS.

- 1 Anvil, 100 lbs.
- 1 Anvil block.
- 4 Aprons smith's.
- 1 Brush, horse tail.
- 1 Bucket, forge.
- 2 Boxes, shoeing leather.
- 1 Calipers, smith.
- 2 Chisels for hot iron, handled, assorted.
- 2 Chisels for cold iron, handled, assorted.
- 2 Chisels, cold hand.
- 1 Compass, common.
- 1 Oil dropper, pint, brass.
- 4 Dies and taps } size suitable for
- 1 Die stock for above } new iron carriage.
- 6 Drills, assorted for brace, hand.
- 12 Files, smiths, assorted.
- 3 File handles, patent.
- 1 Fuller, handled.

- | | |
|---|--------------------------------------|
| 1 Hammer, hand, handled. | 1 Punch, square, handled. |
| 1 Hammer, riveting, handled. | 1 Punch, center hand. |
| 4 Hammers, shoeing, handled, | 1 Punch, nail hand. |
| 1 Hammer, sledge, handled, 9 lbs., steel faced. | 12 Rasps, shoeing, 16 inch. |
| 2 Hardies. | 1 Screw driver, hand. |
| 12 Shoeing knives. | 1 Shovel, coal. |
| 1 Oil stone, 2-lb. | 1 Shovel, smiths. |
| 3 Pincers, shoeing. | Swedges, bottom and top, 1 set each. |
| 1 Pincers, small. | 1 Split broom. |
| 1 Poker. | 1 Square, steel. |
| 1 Pritchell, or clinching iron. | 3 Tongs, smiths. |
| 1 Punch, round, hand. | 2 Vises, hand, small and large. |
| 1 Punch, square, hand. | 1 Vise on forge. |
| 1 Punch, fore, hand. | 1 Wrench, monkey, patent. |
| 1 Punch, round, handled. | 1 Wrench, tap. |

STORES.

- | | |
|---|-------------------------------------|
| 250 Coal, bituminous, lbs. | 25 Iron, round, assorted, lbs. |
| 2 Chains, Nos. 1 and 2-feet. | 25 Iron bar, square, assorted, lbs. |
| 250 Calks, horseshoe. | 50 Links, cold shut, Nos. 3 and 5. |
| 500 Horseshoes, Burden. | 6 Linch-pins and washers. |
| 1 Oil, sperm, quart can. | 5 Steel, blister, lbs. |
| 80 Nails, Globe, lbs., Nos. 7, 8 and 9. | 5 Steel, cast, lbs. |
| Nuts, and bolts and washers, assorted and adapted to the carriages. | 25 Hooks, (Double S), Nos. 1 and 2. |
| 25 Iron bar, flat assorted, lbs. | 10 Tire bolts. |

SADDLERS' TOOLS.

- | | |
|---|--|
| 2 Aprons, saddlers. | 24 Needles, sail. |
| 1 Awl, strap. | 1 Nippers, cutting. |
| 12 Awls and handles, assorted. | 1 Oil stone. |
| 1 Clamp stitching. To be constructed to take apart for packing. | 1 Palm, sailors. |
| 1 Claw tool. | 1 Pincers, pair. |
| 1 Compass, common. | 1 Pliers, pair. |
| 1 Creaser, Lignum Vitae. | 1 Pricking carriage and 3 wheels, Nos. 8, 10 and 12. |
| 2 Edge tools, Nos. 1 and 2. | 1 Punch, hand. |
| 1 Gauge, draw. | 1 Punch, spring, revolving. |
| 1 Hammer, saddlers. | 1 Rivet, set. |
| 1 Knife, channel. | 1 Rule, 2-foot. |
| 1 Knife, splitting, 6-inch. | 1 Sandstone. |
| 1 Knife, half round. | 2 Scissors pairs. |
| 2 Knives, shoe. | 1 Screw driver, 3-inch. |
| 1 Mallet, half round, hand. | 1 Shears, pair, 6 inch-blade. |
| 100 Needles, assorted. | 4 Thimbles. |
| 5 Needles, collar. | |

STORES.

1 Beeswax, lb.	2 Rings, doz.
1 Blackwax, lb.	3 Rivets and burs, copper, assorted, lbs.
1 Bolts, halter, doz.	2 Staples, doz.
2 Bristles, oz.	3 Tacks, iron, papers of.
2 Buckles, doz. iron roller, assorted.	2 Tacks, copper, papers of.
2 Buckles, Carnes' patent, doz., assorted.	2½ Thread, patent shoe, lbs.
1 Buckles, bar doz., assorted.	3 Thread, shoe, lbs.
1 Buckles, girth, doz.	1 Mattock.
2 Leather, bridle, sides.	1 Spade.
75 Leather, harness, lbs.	
Lumber of pieces	2 Axes felling
" " caisson	} each { 8 oz. graduated powder measure
" " battery and wagon	
" " forge	
Caisson body.	18 Spades.
1 Spare wheel,	6 Mattocks.
1 " Pole.	4 Picks.
3 Shovels,	20 Axes.
1 Mattock.	10 Paulens, 12x14.
4 Spades.	4 Space wheels.
1 Pick.	4 " poles.
1 Single-tree.	4 " single-trees.
1 Wheel-trace.	4 " wheel traces.
1 Lead-trace.	4 " lead traces.
12 Shovels.	

Beside former supplies in Battery Wagon and Forge.



OUR ARMY AND NAVY.*

BY GEN. PHILIP ST. GEORGE COOKE, A. M., U. S. A.

THUS viewed, my subject is an old—rather hackneyed one; and I proposed to myself to give a study or two, as artists say, of the Army and Navy, of their present and prospective means and methods of work.

The thought that the marvelous inventions and discoveries in fire-arms, machine-guns, explosives, even at their present stage, may soon put an end to important wars, is forcing itself on us. I gave it a parenthesis, in the *Army and Navy Journal*, near two years ago. "Do they not threaten to make War too destructive for human resort?"

But the end is not yet! The relations of great European Powers are now very "strained," and some of them seem to have become suddenly possessed of the old Berserker spirit, and have been making encroachments, and seizures of territory the world round—"colonizing." And specially are there notes of War between our "mother" country, "Empire" now, and our constant friend, that other young, great and growing Power, that doth bestride the other hemisphere "like a colossus." These machine-guns and explosives have, as yet, been scarcely tried; but I fancy their time will be soon.

But the invention of gunpowder gave rise to similar thoughts, and strange to say, though great changes did follow, they were in an opposite sense to those foreboded. The older world used to fight very much on horseback—which was very gentlemanly in them—but somehow they considered armor an essential of Cavalry, and it had to be thrown aside, as expected; but the change instead of injuring, added much, as I could show, to its range of

* Extract from an address to the Michigan Commandery of the Loyal Legion, in April, 1886.

action and its value. And in general, instead of becoming more destructive to life, War became very much less so ; which is easily explained : In old times the principal fighting was necessarily hand to hand ; and we read that, with great loss doubtless to victors the losing side were generally nearly all slaughtered—very few, I fancy, were only wounded. But, very naturally, fighting at considerable distances promptly followed the general introduction of fire-arms. And incidental, perhaps conducive to the change was a greater scope for strategy.

I recall but one other important cause of change in the conduct of War, *vis.* : Railroads. These have greatly enlarged the scope of action, and have quite aggrandized strategy : but in fact the telegraph fits so closely with the railroad that its immense influence I have failed to mention separately.

These modern discoveries and ameliorations have very great tendency to enlarge the dominion of mind over matter.

Our word *strategist* is a derivative of words in the languages of the two ancient civilizations of Europe—the great conquering Powers—signifying in them simply leaders—army commanders. Many of us were educated to very exalted ideas of the generals of their armies—especially of those immortals, Cæsar and Alexander ; so very high that we hesitate to name their peer in all the tide of twenty centuries. But now should not the military portion of their fame be re-considered in comparison to modern military genius, developed by the application of great strategic agents ? And the great warriors named, were heads of the foremost nations, and commanded the best disciplined armies, of their different periods, and famously brave ; and they conquered inferior, uncivilized nations ; perhaps, very similarly to the British conquest of India.

Should then, their great victories and conquests, the results chiefly of hand-to-hand battles and brutal slaughters, give them rank above, or even equal to modern commanders who have conquered great armies (which, with their generals, had equal advantages) by virtue of superior strategy ? both sides depending on the results of brain power, rather than of brute force.

Let me say here that the combined discoveries, steam and railways, I think far the greatest achieved by man ; arming civilization with a thousand-fold of its old powers in the rapid extension of all manner of benefits, comforts and happiness. It alone made possible, and easy, our ocean boundaries.

I mentioned dynamite and other explosives as admitted subsidiaries of War. They are terrible and inscrutable discoveries, and seem to threaten more in Peace than War; they arm the criminal class with fearful power.

One is reminded of the posthumous work of Lord Lytton, called "The Coming Race," its prophetic explosive, which he calls *bril*; used in a slight tube, an army could be destroyed by a child; War ceased, of course; and another deduction of the author is interesting, *viz.*: that fear of death ceased to be felt. But I fancy we shall get on rather comfortably. In fact, I remember that the same author took great alarm and prophesied on the invention of lucifer matches—a general conflagration of haystacks.

But armies as small as ours will ever be necessary; *all* Government is based upon *the* sanction of force; and there must be a school for the science and practice of War, if only on the smallest scale. We seem to be nearly through with our miserable Indian wars; since we have exterminated the buffalo, their great resource for food, the Indians must perish, or submit, and be fed by Government until taught to be self-supporting. But until the Millenium, Civilization will ever encounter violence, to be put down by the strong arm. Witness the present insurrection to invade and possess Oklahoma, a large reservation for Indians, in defiance of law; the President's proclamation, and a regiment of cavalry.

If we have had no revolution in the Art of War by land, since that caused by the gradual introductions of small fire-arms, between three and four hundred years ago, it would seem that the Navy has experienced more than one in the last fifty years or so; it is about that time since the first steamer crossed the Atlantic; and in that time the Navies have undergone a succession of radical changes. The steam engine has nearly supplanted the sail; and iron has taken the place of wood in constructions. It was half a life's practice to make a good sailor; there was the watch for storms, and the nice management of sails to meet them with safety; calms paralyzed their powers.

But now they make voyages through calm or stormy seas, almost alike, in a third of the old time, and combinations long in advance can be reliably made; tactical plans of battle can be executed. And what a change is ramming!

With all this, the ship became more vulnerable than before,

in its exposure to cannon shots through boilers; and among the delicate, though so powerful machinery, occupying much space. And this caused a very serious revolution indeed, not quite ended, but I think with reaction in view; I mean sheathing ships with steel plates.

We all know that in England, and on the Continent, there has been going on for years a sort of material duel between evolved powers of Nature and material resistance. First they armored their ships; then, on trials, they found that enlarged and improved ordnance could pierce or destroy target armor of equal resistance. The next ships were built much more thickly armored; but only to find after a while, that they had no sufficient defense against still larger, enormous guns. Thus they have gone on, at an immense outlay for armor, ships, cannon and targets, which nothing but very great resources and the jealous rivalry of some of the leading Powers could have enabled and induced them to endure. But almost incredible results of human genius and mechanical resource have been reached; monster ships, with steel sheathing twenty-two inches thick, of 12,000 tons displacement; some guns weigh a hundred tons, carrying steel-pointed thunderbolts of about a ton in weight, five or ten miles!

This sounds more like poetry than reality, and Byron must have had the spirit of prophesy when he wrote of "the oak leviathans" of his day, with armament of what now would be called pop-guns:

"The armaments which thunder strike the walls
Of rock-built cities, bidding Nations quake
And Monarchs tremble in their capitals."

But nothing makes us quake and tremble; we soon managed, in 1862, to destroy the most formidable iron-clad that had ever been met in battle.

In National exigences our ingenuity and energy are phenomenal; and we have now in reserve, I believe, Ericsson's sub-marine torpedo-guns; we are experimenting hopefully upon a dynamite cannon likely to neutralize all armor defense! Even now we can destroy through their bottoms the Achilles heel of those monster "Dreadnaughts," if they come.

Don't forget our *wet ditch* three thousand miles wide! It may help our estimate of this defense to reflect on the great protection England has ever found in her twenty-mile-strait, the "Channel." Napoleon gave it very much thought indeed!

After all, the European Powers may find their iron-clad elephants on their hands. None has yet ventured such a voyage as crossing the Atlantic. Their great guns seem very liable to bursting; the unwieldy ships seem very unmanageable. They run against and sink each other in harbor, or summer exercises. They draw too much water to reach any important capital, and they would attack nothing less than a great city. Then we would meet them with torpedo vessels, with sunken torpedoes, flanked by existing fortifications or floating batteries; with earth water-batteries, armed perhaps with dynamite guns.

Have we not been wise in not following the Great Powers very closely in their so expensive experiments? with their succession of failures. Congress, perhaps, has "builded wiser than they knew" in *not* building, yet, great iron-clads. I think the near future will see the Nations building, instead, unarmored ships of draft to allow their passage of river-mouths, and the inlets of sounds; of great speed, to enable them to overtake or evade the war vessels of enemies; and to facilitate the destruction of their commerce. Congress will continue very slow to vote the millions for ships sheathed in armor.

The co-operation of the Army and Navy in the War seemed perfect; in fact, very extraordinary in view of the strange fields of action which the Navy found; *fields* indeed, to be taken literally! Fancy a fleet among the savannas of Red River far above Alexandria, Louisiana! And they owed their escape down the rapids there, to the great engineering skill and resources of Lieutenant-Colonel Bailey of a Wisconsin regiment of Cavalry, then under my command at Baton Rouge. It was by some peculiar method of using dams. That was co-operation!

REVIEWS.

Gibbon's "Address on General Meade."

THE address of General John Gibbon at the unveiling of the statue of Major-General George Gordon Meade, in Philadelphia, on the 18th of October, 1887, has appeared in pamphlet form.

General Gibbon is one of the officers of the Army, who takes an active interest in the military operations and incidents of our great Civil War, in which he was a prominent actor, as well as in the current affairs of the profession of arms. He is earnest in his convictions and out-spoken in his views. Even if such men are not always correct, they aid in eliciting truth, and are essential elements of professional progress.

It is not probable that General Gibbon intended his address to exalt the "Volunteers" at the expense of the "Regulars," but some of his remarks may have that effect. He condemns those Regular officers who tried to enforce Regular army discipline in the volunteer forces, and commends Meade and a few others, in whose minds, he says, "such an idea never found place." Discipline of the soundest kind was the aim of all. How to get it was the question in the Army then as it is now, and always will be. General Gibbon, in recognition of the necessity for it, says, "It was frequently noted during the War, and afterward, how much of the renown gained by volunteer organizations could be traced back to the right direction given to their efforts, by the sound judgment, good, hard, common-sense, firm hand and just dealings of the commanders who first took them in charge."

Sound judgment, good, hard, common-sense, firm hand, and just dealings of commanders are about all that the regular system has ever embraced for establishing discipline in its own ranks or the ranks of volunteers. Manifestly, some officers of the Regular Army, in disciplining volunteers as in everything else, succeeded better than others; but the differences in this respect were due mainly to the laws of Nature, and are no reproach to the Regular Army or its system.

There is a good deal of misunderstanding in the much writing since the War upon the "Volunteers" and "Regulars." These terms, as commonly used, are misleading. There is no difference of importance in the mode of raising or organizing the two forces; and service in both is voluntary and is paid for by the General Government. General Gibbon says that a vol-

unteer is a man "fresh from the ranks of the people and green in all military matters, totally ignorant of the Art of War, its stern requirements, or the exactions and sacrifices incident to the preparation for it." Meade, instead of being totally ignorant of the Art of War, was a graduate of the Military Academy, a Regular officer, and learned in Military Science and Art; yet, in the face of these facts and his own definition of a volunteer, General Gibbon tells us that "Meade was essentially a *volunteer* commanding volunteers." This may be taken as a compliment to Meade and the volunteers at the expense of the Regulars. General Gibbon makes the further assertion that, during the War the volunteer cry, "'show us the right road,' constituted the opportunity of the Regular Army, and almost every one possessed of the simplest A, B, C of the Military Art was eventually pushed to the front." In its broad meaning this statement is not correct, and is hardly just to the Regular Service. Instead of eagerly pushing to the front almost every one in the Regular Army who possessed the simplest A, B, C of the Military Art, the Government eagerly pushed civilians forward, and for various reasons, good and bad, held back many Regular officers, who were well-versed in their profession. It was well for the cause of the Union that General Gibbon was not one of those held back.

The real difference between the Volunteer and the Regular, is, that one has military education and training and the other has not. The question as to the merits of the two, is therefore, merely a question as to the value of professional education and practice. Can War be conducted better by men who make it their sole business to study its science and art during Peace, than by men who must learn all they know of it, in the school of experience after War breaks out? That is the essence of the question between the "Volunteer" and the "Regular" system, the so-called National Guard lying between the two. The Military Academy at West Point forms with us, the corner-stone of one system, and men of whom General Logan was a type, form the corner-stone of the other. General Logan saw the issue plainly enough; and in his book "The Volunteer Soldier," boldly attacked military education; but it is not going too far to say that, upon this point at least, his book is a sufficient answer unto itself. The rough and costly school of experience developed in General Logan, as it did in others, many of the traits of good soldier-ship. But General Logan was gifted and fortunate; and his success proves no more against the advantage of studying the profession of arms, than Blind-Tom's wonderful musical performances prove against the study of music. A bright fellow who had registered himself on a western river boat during the War, as M. D.—meaning Mule Driver, not Doctor—was called as a physician in an emergency; and by giving the sick man some horse-medicine, cured him, without knowing anything about the disease or the medicine. He had taken one lesson by experience. Possibly if he had had enough experience he might have become a good doctor; but he did not reason from his success that medical education is unnecessary. The truth is, there is no *reasoning* away the folly, that the best men to rely upon for one of the most important duties of life, are those who know nothing about the

duty to be suddenly thrust upon them. A force, to produce effect, must have a point of application. There is no point of application for the force of argument, in the absurdity, that men without any knowledge of the Science of War—a science embracing all others—are better qualified to conduct War than men educated and practiced in that science.

When General Gibbon shakes off the harness, and turns himself loose in the broad and flowery field of the "American Volunteer," he sometimes unconsciously gallops up alarmingly near to the dark abyss into which General Logan fell; but he will not tumble over the precipice. Indeed he has with great vigor and acumen, defended military education against Logan's attack.

The intelligence, patriotism, courage, fortitude, and adaptability of the American Volunteer, cannot be over-estimated. The only purpose in these remarks is to urge that his innate strength, and his noble deeds and valuable services in War shall not be admitted as evidence that Military Education in Peace is unnecessary.

Like many other military writers of the time, General Gibbon makes a fling at Halleck. In a telegram to Meade after the battle of Gettysburg, Halleck said there was "great dissatisfaction in the mind of the President at the escape of Lee's Army without another battle." In this, General Gibbon asserts that Halleck used language "which the good President would hardly have made use of himself." No proof is offered that Halleck did not say just what the "good President" directed him to say. On the other hand there is reason to believe—notwithstanding the subsequent softening down by substituting the word disappointment for dissatisfaction—that the President felt dissatisfied.

The following frank and manly letter in Meade's own handwriting shows how he felt towards Halleck:

[UNOFFICIAL.]

HEADQUARTERS, A. P., July 31, 1863.

MAJ-GEN. HALLECK, *Gen.-in-Chief*.

MY DEAR GENERAL:—I thank you most sincerely and heartily for your kind and generous letter of the 28th inst., received last evening. It would be wrong in me to deny that I feared there existed in the minds both of the President and yourself an idea that I had failed to do, what another would and could have done in the withdrawal of Lee's Army. The expression you have been pleased to use in a letter, *to wit*: a feeling of disappointment, is one that I cheerfully accept and readily admit was as keenly felt by myself as anyone. But permit me dear General to call your attention to the distinction between disappointment and dissatisfaction. The one was a natural feeling in view of the momentous consequences that would have resulted from a *successful* attack, but does not necessarily carry with it any censure. I could not view the latter expression in any other light than as intending to convey an expression of opinion on the part of the President, that I had failed to do, what I might and should have done. Now let me say in the frankness which characterizes your letter, that perhaps the President was right. If such was the case it was my duty to give him an opportunity to replace me by one better fitted for the command of the Army. It was, I assure you with such feeling, that I applied to be relieved. It was not from any personal considerations, for I have tried in this whole War to forget all personal considerations, and I have always maintained they should not for an instant influence any one's

action. Of course, you will understand, that I do not agree that the President was right—and I feel sure when the true state of the case comes to be known, that however natural and great may be the feeling of disappointment that no blame will be attached to any one. Had I have attacked Lee the day I proposed to do so, and in the ignorance that then existed of his position, I have every reason to believe the attack would have been unsuccessful and would have resulted disastrously. This opinion is founded on the judgment of numerous distinguished officers, after inspecting Lee's vacated works and position. Among these officers I could name Generals Sedgwick, Wright, Slocum, Hayes, Sykes, and others. The idea that Lee had abandoned his lines early in the day, that he withdrew, I have positive intelligence is not correct, and that not a man was withdrawn until after dark. I mention these facts to remove the impression which newspaper correspondents have given the public: that it was only necessary to advance to secure an easy victory. I had great responsibility thrown on me; on one side, were the known and important fruits of victory, and on the other, the equally important and terrible consequences of a defeat. I considered my position at Williamsport very different from that at Gettysburg. When I left Frederick, it was with the firm determination to attack and fight Lee without regard to time or place as soon as I could come in contact with him. But, after defeating him and requiring him to abandon his schemes of invasion, I did not think myself justified in making a blind attack, simply to prevent his escape, and running all the risks attending such a venture. Now, as I said before, in this, perhaps I erred in judgment, for I take this occasion to say to you, and through you to the President—that I have no pretensions to any superior capacity for the post he has assigned me to—that all I can do is to exert my utmost efforts and do the best I can; but that the moment those who have a right to judge my actions, think and feel satisfied either that I am wanting, or that another would do better, that moment I earnestly desire to be relieved, not on my own account, but on account of the country and the cause. You must excuse so much egotism, but your kind letter in a measure renders it necessary. I feel, General, very proud of your good opinion, and assure you I shall endeavor in the future to continue to merit it. Reciprocating the kind feeling you have expressed.

I remain, General,

Most truly and respectfully yours,

GEORGE. G. MEADE,

Major-Gen.

This letter is of interest not only as evidence of good feeling between Meade and Halleck, but as showing that when Meade left Frederick it was with the firm "determination to attack and fight Lee *without regard to time or place, as soon as he could come in contact with him,*" but that, having defeated Lee and thwarted his "schemes of invasion," Meade was not willing, under the circumstances, to stake the "known and important fruits of victory," at Gettysburg, by bringing on another battle with his defeated but dangerous foe.—J. B. F.

McMaster's "History of the People."*

THE title of this pretentious publication at once suggests John Richard Green's "History of the English People," but the comparison only exists in name.

The use of the expression "Civil War" itself displays an ignorance quite too common lately—because it is the outgrowth of a weak desire to condone and gloss over, when there is no repentance, the political crime of treason.

The War of 1861-5 was not, as urged by the late Alexander H. Stephens, a "War between the States;" nor was it a *Civil* War, where the opposing parties, like in the Cromwellian Wars from 1642, were distributed over the Territory, and sought only some change of Government, Constitution, or laws; but it was, in the definition of President Woolsey, a localized rebellion, insurrection or revolt, aiming at sundering parts before united.

The War of 1861-5 was, therefore, a War of Rebellion confined to a certain geographical portion of the United States, and was an insurrectionary effort to throw off allegiance to the National Government. Mr. McMaster, however, in the third line of his opening chapter, improperly characterizes it as "the War between the States," thus ignoring the Government of which he is, presumably, a native-born citizen—a Government which sent over a million men into the field to successfully put down rebellion.

Mr. McMaster is yet a young man, having graduated at the College of the City of New York in the Class of 1872, at the age of twenty years and three months.

We are not informed how soon thereafter he projected the work under consideration, or when he began his special studies preliminary to writing it.

A history of a people should be a philosophical work, and the groundwork must be a patient, laborious, and exhaustive study of the history of the Government of the country.

Neither genius nor talent will make an historian. He cannot create, and he can only become possessed of the requisite knowledge of *facts* by the most laborious practices.

The venerable George Bancroft began in 1823 to prepare to write his history of the United States, and even at the present time, in his eighty-sixth year, is found making material alterations in the text of his latest edition.

Mr. McMaster, in our opinion, began his work a quarter of a century too soon for his desired character as an historian, although, so great is the ignorance sometimes manifested, that it has already advanced him to a chair in the University of Pennsylvania.

We feel that we are not unduly severe in this criticism, because, as a lover of American History, it is not pleasant to see an historical romance gravely put forth as veritable fact.

The first noticeable thing in Mr. McMaster's work is his curious imitation of Lord Macaulay, whom he seems to have taken for his model, and

* *History of the People of the United States, from the Revolution to the Civil War.* By John Bach McMaster. In five Vols., 8 vo. Vol. I, pp. 622, and Vol. II, pp. 656. D. Appleton & Co.

his first chapter at once suggests the famous opening of the "History of England."

The *Boston Evening Transcript*, in reviewing Mr. McMaster's work, colated the following, which shows something beyond mere imitation :

From McMaster's History.
(Page 5.)

We are in no danger of being tomahawked. We are not terrified by his war-whoop. An Indian in his paint and feathers is now a much rarer show than a Bengal tiger or a white bear from the polar sea.

From Macaulay's History.
(Chap. 3.)

Some of these races the progress of cultivation has extirpated. Of others, the numbers are so much diminished that men crowd to gaze at a specimen as at a Bengal tiger or a polar bear.

From McMaster's History.
(Page 26.)

The students lodged in the dormitories and ate at the commons. The food then partaken of with thankfulness would now create a riot in a poorhouse.

From Macaulay's History.
(Chap. 3.)

When noblemen were destitute of comforts, the want of which would be intolerable to a modern footman, when farmers and shopkeepers breakfasted on loaves the very sight of which would raise a riot in a modern workhouse.

From McMaster's History.
(Page 140.)

[Referring to the people inhabiting the territory bordering on the Mississippi, 1784.]

No judges ever journeyed to them to correct abuses, to mete out justice, to vindicate the majesty of the law. But, left to themselves, the people administered a prompt and rude justice with the knife and the gun.

From Macaulay's History.
(Chap. 3.)

There was as great a difference between Middlesex and Northumberland as there now is between Massachusetts and the settlements of those squatters who, far to the west of the Mississippi, administer a rude justice with the rifle and dagger.

Another reviewer, remarking on this peculiarity, said : "Skillful imitation is not a virtue. When it descends to the actual adaptation of sentences or entire passages, *mutatis mutandis*, it becomes a crime not easily distinguishable from theft," and thereupon presents the following as a marked illustration :

McMaster's History, (pp. 274, 275).

Harrison, Braxton and Merriwether Smith were for State measures. Nor were there, in the House of Deputies, three men whose opinions were heard with greater respect. They were perhaps the oldest members of the House, and possessed all that traditional influence which in legislative bodies is always exercised by the old men over the new. They had, all three of them, been members of the Continental Congress, had often been employed in the councils of the State, while Harrison and Braxton added the further renown of having set their names to the Declaration of Independence. Benjamin Harrison was a bold, frank, outspoken man. He had all his life been active in the cause of liberty, and had, in the early movements of the Revolution, borne a part

Rives's Life and Times of Madison, (Vol. II, pp. 44, 45).

The Body contained a smaller number than usual of old members invested with a traditional influence. Colonel Harrison, Mr. Braxton and Mr. Meriwether Smith were, perhaps, the oldest members. All three of them had been members of the Continental Congress as well as often employed in the councils of the State, and the two former had the further prestige of being signers of the Declaration of Independence.

Colonel Harrison was a bold, frank man, and had been zealous and decided in all the early movements of the Revolution. When John Dickinson, in the Congress of 1775, expressed his self-complacency with regard to the second petition to the King, of which he was himself mainly the author, by saying there was but one word in the

marked with zeal and decision. A story is told of him which deserves to be narrated, as it finely illustrates the character of the man. In the Congress of 1775, when the second petition to the King was under discussion, John Dickinson, who had the chief part in framing it, said that there was but one word in the paper he disapproved of, and that word was Congress. Scarcely had he said so when Harrison jumped to his feet and exclaimed: "There is but one word in the paper, Mr. President, which I approve, and that word is Congress." In the War he carried arms with distinction, rose to be colonel of a regiment of foot, had lately been Governor of Virginia, and had commenced the present session of the Legislature with an animated contest for the Speaker's chair. Braxton, like Harrison, was early distinguished for the firmness and zeal with which he defended the rights of the Colonies; no one had been more active in behalf of Henry's resolutions on the Stamp Act. Yet his popularity was for a time under a cloud. He had, while Virginia delegate to Congress, recommended to the Virginia Convention of 1776 a plan of government under the signature of "A Native." The scheme was coldly received, the author was believed to be much biassed by his two years' residence in England, and soon after lost his seat in Congress. But of the three, the political career of Meriwether Smith had been the most singular. He was a merchant, and believed to be quite familiar with public affairs. His pursuits, indeed, as a merchant, gave him great aptitude in the dispatch of business. But they were believed by his friends to have affected his political views as nothing else could. No man, as a delegate to Congress, ever went through so many stages of favor and of disfavor with his constituents. For his conduct on one occasion he was

paper of which he disapproved, and that was the word "Congress," it was Colonel Harrison who rose and said: "There is but one word in the paper, Mr. President, which I approve, and that word is Congress."

Mr. Braxton, though he had shown no want of firmness or zeal in maintaining the rights of America at all times, and was even among the champions of Mr. Henry's resolutions on the Stamp Act, had incurred a temporary loss of popularity by the scheme of government which he recommended to the Virginia Convention, under the signature of "A Native," in 1776. It was in consequence of the bad odor of that scheme, regarded with the more jealousy, perhaps, on account of the former residence of the author for a year or two in England, that he was soon afterward pre-terminated in the delegation to Congress.

Mr. Meriwether Smith was much conversant in affairs both public and private. His pursuits and connections as a merchant, while they gave him a greater aptitude for the conduct of business, were supposed, on some occasions, to impart a professional bias to his political views. As a delegate in Congress, he underwent many vicissitudes of favor and disfavor with his constituents; at one time receiving their thanks, at another their censures, and in several instances subjected to charges and investigations which, though terminating in exculpation, implied a certain degree of eccentricity and impracticableness in the character exposed to them.

warmly thanked. For his conduct on another he was strongly censured. Several times he was subjected to charges and investigations which, though ending indeed in a full acquittal, marked him out as an eccentric and impracticable character.

This same reviewer, in commenting on the author's close imitation of Macaulay's trick of rhetorical amplification, gives the following very good illustration from his account of Noah Webster's attempted reform of the alphabet: (vol. i, p. 428.)

"Such was his enthusiasm and conceit that he felt quite sure that letters familiar to hundreds of generations of men and older than any other institution, human or divine, then existing; letters that had seen the rise of every language of Western Europe, that were old when the first Saxon set foot in Britain, when Christ came on earth, when Cæsar invaded Gaul, when Rome was still a petty hamlet on the banks of the Tiber—would, at his suggestion, be ruthlessly swept away."

Sophomoric effusions of this character are out of place in a work having any pretensions to philosophic research and deductions.

The reason why Mr. McMaster's work is objectionable under its present title is because it is misleading. He has not had time or opportunity to learn always the truth, and he has mixed fact with fiction—in a way calculated to do great injury to the historical student. As a consequence, with faulty premises, his philosophical conclusions are as apt to be wrong as right.

Mr. McMaster has accepted the newspapers of the time as containing statements generally to be relied on, and he has thus been led into many gross errors.

For some reason or other he seems to have conceived a great prejudice against the State of Rhode Island, which he is never tired of denouncing, and, in one place, devotes ten pages to a spirited account of alleged paper-money difficulties in 1786, which account he extracts principally from obscure newspapers.

At page 203 he uses this inexcusable language :

"Of the thirteen States, Rhode Island and Providence Plantations had always been the most lukewarm and discontented, and was now entering on that infamous course which makes it impossible to read her history down to the day when she entered the Union under the Federal Constitution without feelings of indignation and contempt. No State paid its quota more grudgingly. None was so often without representation. None, not even New York, was actuated by so selfish and ungenerous a policy. The vague theories, the wild schemes of finance, of Government, and of trade, which in other States were stoutly combatted by the good sense of the community, seemed, in Rhode Island, to have been adopted by the rabble, and there the voice of the rabble was heard with great respect."

Mr. McMaster's reckless assertions are the outgrowth of conceited ignorance.

We venture to say that no State of the original thirteen made proportionately greater efforts in the cause of American Independence than Rhode Island. Up to the close of the year 1780 she had contributed more money to the common cause than all the States together south of Mason and Dixon's line.

She was exclusively a maritime State—depending on commerce for the support of her population and Government. In December, 1776, a British army took possession of the island of Rhode Island, and blockaded Narragansett Bay, and remained until October 25, 1779.

Not only did Rhode Island, under these distressingly adverse circumstances, maintain her quota of two regiments in the Continental Army, but she also gave to the general defense for three and a half years, *three additional* regiments, *namely*: two of Infantry and one of Artillery.

When the British finally evacuated the State, the island of Rhode Island was left practically barren and divested of its timber. Newport was almost destroyed. The town of Bristol had been burnt by the British in an incursion, and all in all, no State was in such a poverty-stricken condition.

The people, however, were of unmixed English descent—God-fearing, sober, industrious, and patriotic.

In religious belief no man had ever been questioned, and the bulk of the population was largely either of the Baptist or Episcopal denominations of Christians.

The reason Rhode Island's delegates to the Congress under the Confederation were occasionally absent, was because of their poverty.

We cannot however expect so young a "historian" as Mr. McMaster to know all these things, but we do insist he should be less defamatory.

Again, speaking of the measures taken toward the adoption of the present Constitution for the United States (vol. 1, p. 392), he says:

"What would be done by Rhode Island no one cared. The unhappy condition into which that once prosperous State had fallen was indeed most deplorable. She was scarce looked upon as any longer a member of the Union. Her name had become a byword and a reproach, and was never mentioned without a wagging of the head and a shooting out of the tongue.

"She was nicknamed Rogue's Island. * * * When a merchant violated his engagements, when an agent betrayed his trust, when a tradesman defrauded his customers, the term of reproach applied to him was Rhode Island's faith. * * *

"The most sanguine Federalist never for a moment supposed that a State ruled by men so given over to dark and crooked ways would join the Convention."

It is not possible in the limit of this review to point out the falsehood of this libel, but it affords a good commentary on the inability of Mr. McMaster to bring to his labor any other spirit than that which delights in *Police Gazette* news.

When he studies more he will learn that, in the language of Mr. Justice Baldwin of the U. S. Supreme Court, the method by which our present Constitution was submitted and adopted—was essentially revolutionary—and not as provided for in the articles of Confederation.

Rhode Island had been requested by Congress to relinquish to it the power to lay Customs duties—but, in the impoverished condition of the State this was not practicable—as those duties were, at that time needed for the support of the State Government.

This was the fundamental reason why Rhode Island delayed her acceptance of the new Constitution until her statesmen saw that internal taxes could be laid with safety in consequence of the more prosperous condition of her people.

But it is not as to Rhode Island alone that Mr. McMaster displays aversion—as we shall see later on.

The Continental Army of the Revolution—to whom in the Providence of God, the United States—are largely indebted for their independence, is presented as being in 1783, mutinous and rebellious.

Says he: (p. 180.) "Thankless and ungrateful as may seem the ill-humor, the Country was in with the Army, *no small part of it is to be ascribed to a number of acts for which the rank and file could blame no one but themselves.*"

The first Newburgh address by Major John Armstrong, Aide-de-Camp,

anonymously issued, in which a meeting was suggested to consider their grievances—is made the occasion of the following false statement. (p. 183.)

"Washington the next day heard with deep mortification of the action of the troops."

The troops had taken no action whatever and Mr. McMaster ought to know it.

Their condition was pitiable, and hardly an officer but had been ruined in his private estate in his effort to continue in the service of his Country. Congressional promises had shamefully been violated—often on the verge of starvation—always paid in a depreciated currency, and, for the last two or three years of the War not paid at all—they continued at their posts of duty, and, *with permission*, sent a Committee to represent matters to Congress.

They never however, *acted* against their Country, as Mr. McMaster would imply—and we protest against such an audacious inference.

That Congress would have got rid of the Army like a squeezed lemon—but for Major Armstrong's address—seems probable.

It afforded an opportunity for General Washington—with great tact, to call a representative meeting of officers, and thus put before the Country the conduct of Congress.

Mr. McMaster recites the subsequent meeting at Lancaster of eighty raw recruits—who, in June 1783, marched on Philadelphia where Congress was assembled—to obtain redress of their serious grievances.

They appeared before the State House where Congress, as well as the Council of State of Pennsylvania were sitting, but did no damage to person or property.

The conduct of Congress was pusillanimous to the last degree, and indeed, with a few individual exceptions, that body had then sunk, in public estimation, about as low as possible.

The Pennsylvania Council of State apparently had an ill-concealed contempt for it, because when a request was made for protection, replied that they could not venture to call out the militia unless some outrage was committed or property destroyed—as they were by no means sure that the militia would act against their brothers in arms.

Congress adjourned to Princeton, making this insignificant *excuse*, the excuse. One fact is certain, and that is, that Congress had been trying in a disgraceful and dishonorable way, to see how it could violate repeated promises to the Continental Line and avoid the solemn obligations which had been incurred toward them.

It succeeded in its endeavor, and officers and men went peaceably to their homes on disbandment, ruined in their private estates.

Not until 1828, after most of them were deceased, did Congress undertake to fulfill its early promises.

We think Mr. McMaster has made too much of the Lancaster incident and regret he so words his description as to make it appear that the Continental officers were concerned in it which was not the fact.

Two ex-lieutenants, one of whom, an Irishman, but four years in the Country, undoubtedly participated, but it is to be said of them that when

they left the Army about two and a half years before—it was on the promise of Congress that they should receive half pay for life which they never got.

In another place (p. 176) Mr. McMaster again exhibits historical inaccuracy in the following statement:

“Angry as the people were with the officers, they were in still worse humor with the men.

“When the War was over, a clamor was raised that the Army should instantly be disbanded.

“But a large arrearage of pay was due, and the troops seemed little inclined to lay down their arms till it had been paid to the last shilling. In this strait Congress passed several acts for the relief of the Army.”

This statement is misleading, and if Mr. McMaster had been old enough to serve in the late War of the Rebellion—to preserve that Union which our ancestors fought to secure, we venture to say he would have refrained from libelling so intensely and nationally patriotic a body as the Continental Line of the Revolution.

The officers never did anything to deserve the anger of civilians and the troops of the main Continental Army never presumed to dictate terms to Congress.

When Mr. McMaster has had a little more time for study and reflection, and knows more about that incomparable Regular force, he will never cease to wonder, how, in the extremity of poverty and distress, and often at the verge of starvation they kept soul and body together and stood by their tattered colors—with a character, cheerfully accorded by the French officers, after personal inspection, as the equal in drill and discipline of the best troops in Europe.

The author devotes ten pages (167-176,) to the Society of the Cincinnati, instituted in 1783, and says that “the sharpest laws were thought necessary to protect the new liberties of the State from its baneful influence,” and, that “then the officer who subscribed to its laws laid down in many States his rights of Citizenship.”

There is not a word of truth in either of these quotations, but they afford a conspicuous illustration of Mr. McMaster's method of making his book spicy and entertaining.

Again he says the Legislature of Massachusetts declared the Society “dangerous to the peace, liberty and safety of the Union;” and that Rhode Island disfranchised such of her Citizens as were Members of the Order, and the opposition then spread to South Carolina.”

None of these statements are true. A Committee of the Lower House of the Massachusetts' General Court brought in a report containing the quoted words—but the whole subject was remitted to a subsequent General Court and never revived—except in the way of a special and ample Charter of Incorporation granted the Massachusetts' State Society of the Cincinnati.

As to Rhode Island—none of the original thirteen States ever have done as much in the way of direct legislation to show their appreciation of the Cincinnati as Rhode Island for its State Society.

The annual Fourth of July meetings, from 1783, when Major-General

Nathanael Greene presided, were always held in the Senate Chamber of the State House, and for many years a military escort was given by the uniformed Militia.

In South Carolina, except the eccentric Irishman, Aedanus Burke, there never was any opposition, and the President of that State Society, Major-General William Moultrie, was for a number of years Governor of the State.

With hardly an exception, the best men in the country were honored members, and included several signers of the Declaration of Independence, and Presidents of Congress, and such military men as Washington, Schuyler, Steuben, Lafayette, George Clinton and his brother James, Greene, Sullivan, Benjamin Lincoln and Knox, Francis Marion, Horatio Gates, Mifflin, Charles Cotesworth Pinckney, and Alexander Hamilton.

We suspect that if Mr. McMaster had continued his work to the close of the Rebellion, he would be found retailing irresponsible newspaper reflections against the Military Order of the Loyal Legion, whose basis is the same as that of the Cincinnati, and against the Grand Army of the Republic.

In his references to South Carolina, the author is conspicuously inexact, so much so that even the authorities he sometimes gives in foot-notes do not confirm his assertions.

Thus, on page 27 (Vol. I.), he says that "in that Colony, prior to 1730, no such thing as a grammar school existed. Between 1731 and 1776 there were five. During the Revolution there were none."

He refers us to Dr. Ramsay's History of South Carolina, which, however, does not support his statement.

In 1711, the Society for the Propagation of the Gospel in Foreign Parts established in Charlestown—at request of gentlemen in the Province of South Carolina—a school, and placed it under the Rev. William Guy, A.M.

In 1734, the population of South Carolina amounted to but seven thousand three hundred and thirty-three, and three years later there were six free schools established, or one to about every twelve hundred inhabitants.

At the close of the Revolution, there were in the State of South Carolina eleven public and three charitable grammar schools, and eight private schools, or twenty-two in all, in the twenty-four Parishes and Districts.

Mr. McMaster has followed up his erroneous statement as to schools by saying, as to newspapers, that if the number printed in any community may be taken as a gauge of the education of the people, the condition of the Southern States, as compared with the Eastern and Middle, was most deplorable, and that South Carolina, in 1775, had but three newspapers, while there were fourteen in New England, four in New York, nine in Pennsylvania, two in Virginia, two in North Carolina, and one in Georgia.

To gauge the education of a people by such a standard is absurd. Thus, for example, New Jersey had no newspapers, but two colleges, one at Princeton (Coll. of N. J.), and one at New Brunswick (Queen's, now Rutgers).

If we ascertain the number of free white inhabitants in each Province, in 1775, and compare it with the number of newspapers, South Carolina will be found to have had one newspaper to every twenty thousand; Massachu-

sets one to every fifty-two thousand two hundred and eighty-five; Pennsylvania, one newspaper to every thirty-six thousand six hundred and sixty-six; Connecticut, one newspaper to every forty-nine thousand three hundred and forty, and New Hampshire one to eighty-two thousand two hundred.

The limits of this review will not permit us to go further into this subject, in controverting the author's statements, or in exposing the falsity of his deductions.

In his latest volume, in speaking of James Callendar, a newspaper scribbler patronized by Jefferson, he says:

"His business was to gather all the political scandal, all the foul abuse, all the libels, all the mean lies that circulated through the press, to distort Congressional speeches, to misinterpret good acts, to attribute false motives, to digest the scurrility of *The Aurora*, of *The Argus*, of *The Independent Chronicle*, and once a year send out the whole mass in the form of a book."

A recent reviewer, commenting on this passage, says:

"We do not suspect Mr. McMaster of conscious misrepresentations, but in other respects his business is the same as Callendar's. His volume reeks with muck, collected from scandalous journals and pamphlets. * * * Of the great qualities of the statesmen of the era under review, and the influence which some of them certainly have exercised upon the whole subsequent history of the Republic, Mr. McMaster has no conception.

"He admires nobody. Toward those whom he does not abuse he is cold and indifferent. We can recall, in his thick book, only one cordial expression toward an American leader, and that is not well considered. The career of Andrew Jackson belongs to a later period, but Jackson is briefly introduced as a lad 'whose intrepidity, whose energy, whose fiery temper and intense love of right made him, in after years, the most remarkable man the Republic had yet produced.' This is not true.

"Jackson was not the most remarkable man the Republic had produced; far from it; and he was distinguished for his intense, though ignorant, love of wrong."

This peculiarity of Mr. McMaster is illustrated in his description of Thomas Paine and Washington. Four pages are devoted to the "character" of the former, couched in language of unmeasured abuse.

The following is a very fair sample (p. 150, Vol. I.):

"We doubt whether any name in our Revolutionary history, *not excepting that of Benedict Arnold*, is quite so odious as the name of Thomas Paine.

"Arnold was a traitor.

"Paine was an infidel.

"Indeed, the terms in which he is commonly described, and the epithets which are commonly heaped upon him, should seem to imply that, of all infidels, Paine was the blackest, and that since the day when the 'Age of Reason' came forth from the press, the number of infidels has increased much more rapidly than it did before that book was written."

Fortunately, Mr. McMaster, in a foot-note, gives us the source of information for the scurrilous and untruthful portion of his pen-picture, as being

from the "Life of Thomas Paine, by Cheetham," a political pamphleteer of English birth, whom Mr. Paine, in his lifetime, branded as an "impostor," and who was, subsequently, convicted of an infamous criminal libel, connected with his account of Mr. Paine.

It is matter of regret that so ignorant a person as the author shows himself to be should, at this late day, revive libels, in order to present them anew in entertaining form. When he has had time to read Mr. Paine's "Common Sense," and "The Crisis," which did so much for our Revolutionary cause, and his "Rights of Man," and his "Dissertations on Government," he will then be prepared to read an authentic account of his life, and to learn that he was not an infidel in the sense intended to be conveyed—of atheism, or agnosticism—but a deist who, while denying the Divinity of our Lord and Saviour, ascribed to Him every good attribute.

We cannot advise the author to read the "Age of Reason," because we do not know what effect it would have upon him. It was written during the French Revolution, when Mr. Paine was a Deputy from Calais, in the National Convention, for the express purpose of arresting the progress of atheism.

It is not generally known that Mr. Paine served as Volunteer Aide-de-Camp to Major-General Nathanael Greene, in the retreat through the Jerseys, in 1776, and at "Germantown," or that, in the same quality, he went, in October, 1777, in an open boat, with Colonel Christopher Greene, Commandant of Fort Mercer, from Red Bank, on the Delaware, to Fort Mifflin, on Mud Bank, to inspect the latter post, in which he was exposed to a severe fire, during the terrific bombardment to which Fort Mifflin was subjected.

In 1802, President Jefferson offered him a passage from France to the United States in the frigate *Maryland*, and, in the course of his letter, said :

"You will in general find us returned to sentiments worthy of former times ; in these it will be your glory to have steadily labored, and with as much effect, as any man living. That you may live long to continue your useful labors, and reap the reward in the thankfulness of nations, is my sincere prayer.

"Accept the assurances of my high esteem and affectionate attachment.

"THOMAS JEFFERSON."

Congress, and the States of New York and Pennsylvania, each, in turn showed their appreciation of Mr. Paine's eminent services to his country, by the substantial and munificent gifts of money, or lands and tenements.

It is time that such slanders as Mr. McMaster has again put forth against his memory should cease, and we protest, in the interest of historical truth, against their repetition.

If the author is unjust to Mr. Paine, he is also unjust to the Father of his Country.

In his latest volume he depicts Washington as one whose "true biography is still to be prepared," and that he is "an unknown man."

Surely, the conceit of a comparatively young author of so-called history could not go much further.

He says :

"We shall behold the great commander repairing defeat with marvellous celerity, healing the dissensions of his officers, and calming the passions of his mutinous (?) troops. But we shall also hear his oaths, and see him in those terrible outbursts of passion to which Mr. Jefferson has alluded, and one of which Mr. Lear has described. We shall see him refusing to be paid for his services by Congress, yet exacting from the family of the poor mason the shilling that was his due.

"We shall know him as the cold and forbidding character with whom no fellow-man ever ventured to live on close and familiar terms. We shall respect and honor him for being, not the greatest of generals, not the wisest of statesmen, not the most saintly of his race, but a man with many human frailties and much common-sense, who rose, in the fulness of time, to be the political deliverer of our country."

This quotation shows that Mr. McMaster knows but little of Washington. That during eight years of War the latter was oppressed with the mighty responsibilities of his station, as the sole dependence of his country, and that he was often grave and thoughtful, is undoubtedly true.

That he was cold and forbidding, or that no fellow-man ever ventured to live on close and familiar terms with him, is untrue.

His military family, and the general and field officer-of-the-day, always had seats at his table, and it is too well authenticated for contradiction, that he loved to sit long with them at dinner, listening to the chat of his aides, and occasionally joining in the same.

The almost extravagant and deep affection entertained for him by the Continental officers could not have existed had he been the cold and forbidding character the author would make him.

We have two very good illustrations of Washington's character, the first of which shows his own deep sensibilities, and the other the manner in which he was viewed by his intimates.

In 1782, Maréchal de Camp, the Chevalier de Chastellux of the French Auxiliary Army, visited him at his headquarters in Newburgh.

After his departure, on the 14th December, 1782, Washington wrote to him, from Army Headquarters, and, in the course of his letter, used this language:

"MY DEAR CHEVALIER: I felt too much to express anything, the day I parted from you. A sense of your public services to this country, and gratitude for your private friendship, quite overcame me at the moment of our separation.

"But I should do violence to my feelings and inclination, were I to suffer you to leave this country without the warmest assurances of an affectionate regard for your person and character.

"Our good friend, the Marquis de Lafayette, prepared me, long before I had the honor to see you, for those impressions of esteem, which opportunities and your own benevolent mind have since improved into a deep and lasting friendship; a friendship which neither time nor distance can eradicate. I can truly say, that never in my life have I parted with a man to whom my soul clung more sincerely than it did to you. My warmest wishes will attend you in your voyage across the Atlantic, to the rewards of a gen-

erous prince, the arms of affectionate friends; and be assured, that it will be one of my highest gratifications to keep up a regular intercourse with you by letter. * * * *

Again, we find this "cold, forbidding character, with whom no fellow-man ever ventured to live on close and familiar terms," writing as follows to Lafayette, Dec. 8th, 1784:

"In the moment of our separation, upon the road as I traveled, and every hour since, I have felt all that love, respect and attachment for you with which length of years, close connection, and your merits have inspired me. * * * * It is unnecessary, I persuade myself, to repeat to you, my dear Marquis, the sincerity of my regards and friendship; nor have I words which could express my affection for you were I to attempt it."

Lafayette's letters to Washington abound in expressions of attachment, and as late as October 26th, 1786, we find him writing to Washington, from Paris, as follows:

"MY DEAR GENERAL: To one who so tenderly loves you, who so happily enjoyed the times we have passed together, and who never, on any part of the globe, even in his own house, could feel himself so perfectly at home as in your family, it must be confessed that an irregular, lengthy correspondence, is quite insufficient.

"I beseech you, in the name of our friendship, of that fraternal concern of yours for my happiness, not to miss any opportunity to let me hear from you, my dear General."

Letters of this character could be multiplied, but Washington's character needs no defender from such an author as now under review.

His attempts to imitate Macaulay, particularly in the latest volume, in striking antitheses and sonorous rhetoric, are sometimes ridiculously exhibited.

Thus, in speaking of the yellow fever, in 1793, he says:

"Neither the skill of the doctors, nor the properties of patent medicines, neither Godfrey's Cordial, nor Duffy's Elixir, nor Bateman's Drops, nor Stoughton's Bitters, nor Hooper's Pills, nor Haarlem Oil, could hold it in check."

Again, in referring to the territory north-west of the Ohio, he says:

"Over that splendid country east of the great river, and now embodied in the States of Michigan, Wisconsin, and the northern parts of Indiana and Illinois, *Indians, Jesuits, and buffalo, roamed at will.*"

A recent reviewer, in remarking on this last passage, says, significantly: "*What a country for sport!*" and indulges in the hope that Mr. McMaster "will long enjoy the distinction of having penned the most elaborate libels upon the United States."

Certainly, his two volumes will be considered by many as very interesting, but they must disabuse their minds of the idea that they are a history of our people.

They have been put forth by a great publishing house, with all the resources at its command, and the typography is excellent.

We have to regret, however, that three more volumes are promised, from the same author.

ASA BIRD GARDINER.

An American Cavalryman.*

FEW soldiers can lay down this volume without thanking General Wilson for having rescued from the oblivion of unwritten history, and placed on record for all time, the manly and soldierly qualities and invaluable services of Gen. A. J. Alexander—*nascitur non fit* applies to the soldier as well as the poet. General Alexander was a born soldier and cavalryman, and impressed himself as such, during the active part of his career, upon all who came in contact with him. He was essentially a "Field Marshal" having that quick eye for peculiarities of *terrain*, alert judgment and unfailing resource which ever marks the true leader of men. It is a great pity that our rulers, during the Civil War, could not have had the prescience to recognize the qualities of such men, and place them in their proper niche, but their modesty was generally equal to their ability, and they conscientiously and efficiently plodded through such as was given them to do, in subordinate positions, while weaker men inefficiently occupied the places they would have made illustrious by their courage and capacity.

In these days when selfishness seems to be the rule of life, and utility the only good, it is refreshing to dwell on such a story of unselfish patriotism, heroic devotion and gallant deportment. It shows, too, of what material the typical American is made; how quickly he adapts himself to his surroundings, and rises to the occasion, for Gen. Alexander *was* a typical American; in his veins flowed the strains of blood that have illustrated the pages of this country's history with names of statesmen, patriots and warriors. Leaving the pursuits of civil life to become a soldier, at the outbreak of the Rebellion, he quickly perceived the need of fitting himself for his new profession, and he proceeded to master its details and assimilate its principles. His natural tastes took him to the Cavalry Arm of the Service, and it was not long until he became a skillful and daring cavalryman. In fitting himself for his duties, he also became an efficient organizer and Adjutant-General. It is not often that mastery of details and pains-taking office-work are combined with the dash of the *beau-sabreur*. It was his peculiar characteristic and rendered him unusually efficient wherever his services were demanded, though it cannot cease to be a matter of regret that one so eminently fitted to be a cavalry commander should not earlier have found his proper sphere of action.

General Wilson's volume is a tribute of love and appreciation, worthy of the subject and the author. It is a "plain unvarnished tale," but told with a clearness and directness that makes it interesting and effective, and a valuable addition to the personal history of the actors in the late War. It is also a book that should be read at the fireside of every American home, that its earnest and appreciative recital of heroism, unselfish devotion, and manly virtue may sink deep into the hearts and minds of the future wielders of the destinies of the Republic.—J. J.

* Life and Services of Bvt.-Brig.-Gen. Andrew Jonathan Alexander, U. S. A., by Gen. James H. Wilson, U. S. A. New York Public Service Publishing Co., 1887.

CORRESPONDENCE.

COAST-DEFENSE MATTERS.

[From a Foreign Correspondent of Council.]

HAVING been absent on a visit to England during the publication of your last number, I was unable to send any contribution. I trust that the few notes which I am about to transmit to you will not be unacceptable, seeing that they will contain the record of personal observation.

A visit to Shoeburyness can never prove unprofitable; to me, after three years' absence, it was a true revelation. Perhaps greater strides have been made in gun manufacture in the last few years than in any previous time. We have all read of the changes; we all know that muzzle-loading has completely given way to breech-loading; we all know that guns have increased to almost twice the length of those constructed a few years since of the same calibre. But to see these guns is another matter. Their comparative elegance strikes one first; then the great length and apparent weakness of the chase; its great exposure and vulnerability to the fire of quick-firing guns. I understood that one of these guns had so suffered from a direct blow on the chase, from a projectile from a quick-firing gun, that the bore was sufficiently indented to render the gun unserviceable. I did not see the gun, nor have I, at present, seen any records of this experiment. There can be no doubt, however, that this long-exposed chase is a real weakness; especially must this be the case where guns are mounted in barbette, and where the muzzle is raised high in the air for the purpose of loading.

The latest development of gun-mounting for coast-defense purposes appears to be the Easton and Anderson carriage. A description of this has appeared in the Royal Artillery Institution Proceedings, and your readers will be aware that the gun is mounted in a deep pit, which is covered with a steel shield, the gun rising through an opening in this shield after being loaded. When the gun is in firing position the opening is completely covered, so that the detachment and machinery are absolutely secure from any but vertical fire of heavy projectiles. When the gun is in loading position the opening is covered by a movable shield. The carriage works smoothly and without any difficulty. A pit of this kind had been erected at Lydd, in order to test its invulnerability and to ascertain the best method of attack; the experiment had not taken place before I left.

You know that we are obliged to purchase our steel shells from France. I saw the armor-plates at Shoeburyness which were fired at during the competition between the Firmany and the English-made steel projectiles.

There could be no two words about the superiority of the former. The manufacture of steel projectiles for armor-attack appears to be still a profound secret, and the secret remains in France. Perhaps we may be able to buy or steal it from the French people soon.

I dined one night in the Berber Railway Station at Lydd, the great practice-ground for siege-guns. We went to and from the target on the Suakim-Berber Railway. A large quantity of this plant is made use of here, and no one can say that it is wasted. The railway station is the officers' mess-house. An eight-inch howitzer was being fired, by observation, at a battery invisible from the firing-point. The practice was remarkably good, more than fifty per cent. of the shots falling in the battery, and two of the three guns being dismounted. The range was about 3,000 yards.

I was given to understand that the probable developments of the near future in the artillery-world are wire guns, improved powder (smokeless if possible), and some protection for the bores of heavy guns against the destructive effects of exploded powder, perhaps taking the form of a metal case for the cartridge.

A visit to Chatham was necessary in order to see the new line of forts for the defense of that important dock-yard on the land side. The design for this line of forts has been for many years in existence, but no notice is taken of it in that excellent work, "*Géographie Militaire*," by Marga, which, however, was otherwise very complete up to the date of its publication. The forts are being constructed slowly, by convict labor, and, although all have been begun, yet no single one is complete. This is designedly so, in order that all the latest improvements of the day may be added; and, as a matter of fact, alterations and additions are constantly being made. The chief features to notice are, the absence of any provision for artillery-fire in the works themselves; it is supposed that guns of position and field-guns, behind rapidly-constructed epaulments between the works, would be sufficient to oppose anything that could be brought against them; deep, narrow ditches; great commands and massive parapets; excellent covered communications throughout the interior of the works; and, in every fort, cover for machines and quick-firing guns, with easy passage up to the parapets.

In the dock-yard was the "*Benbow*," with a displacement of 10,000 tons, 110 yards long and 26 yards wide, with two 110-ton guns in her two barbettes, one at either end of her central battery, which itself mounts ten 6-inch, new type guns; and, with a powerful armament of machiné and quick-firing guns, besides torpedoes, which can be discharged ahead, astern and from broadside, she is indeed a formidable fighting machine.

I stood at the breech of one of her big guns and almost wondered whether it could ever be meant to be fired. I saw several 12 1-2-inch, 38-ton muzzle-loading guns, lying alongside on the wharf. Such stumpy, puny things as they looked, and yet a few years ago the best we had! What will be the effect on a hostile vessel struck by a projectile weighing 1,800 pounds, developing an energy of over 60,000-foot tons and capable of piercing three feet of solid iron? After seeing all that there was to be seen on board, I was warned off by a policeman.

E. N.

FOR REVIEW.

The Life and Services of Brev. Brig.-Gen. Andrew Jonathan Alexander, U. S. A. (New York.) Public Service Pub. Co., 1887.

The War of the Rebellion. A Compilation of the Official Records of the Union and Confederate Armies. Series I., Vol. XIX., Part II. (Washington.) 1887.

Horse, Foot and Dragoons. Sketches of Army Life at Home and Abroad. By Rufus Fairchild Zogbaum. (New York.) Harper & Brothers. 1888.

OUR EXCHANGES.

[List of Periodicals in Exchange, with titles of leading articles on professional topics.]

BRAZIL.

Revista Militar Argentina. June, 1887.

El Primer Regimiento de Artilleria y su Jefe.

[The same, July, 1887.]

[The same, Aug., 1887.]

ENGLAND.

Illustrated Naval and Military Magazine. Aug., 1887.

Electric Lighting of Fortifications, Barracks and Hospitals.

Modern Tactics. VII. and VIII.

Palmer's Quick Firing Gun.

[The same, Sept., 1887.]

Modern Tactics. IX.

[The same, Oct., 1887.]

Quick's Breech-Loading Gun.

Modern Tactics. X. and XI.

Yoking Cavalry Horses for Gun-Haulage.

[The same, Nov., 1887.]

Modern Tactics. Chapters XII. and XIII.

The United States Navy of the Future.

Proceedings of the Royal Artillery Institution. July, 1887.

Mountain Artillery, its Organization, Equipment and Tactics. (Prize Essay, 1887.) (Capt. White, R.A.)

[The same, Aug., 1887.]

Cyclists at Volunteer Maneuvers.

The Arming of Gunners of Horse and Field Artillery.

[The same, Sept., 1887.]

Rival Shields for Guns in Land Fortresses.

Replacing Disabled Horses in a Team.

[The same, Oct., 1887.]

Text Book of Gunnery. 1887.

OUR EXCHANGES.

451

INDIA.

Journal of the U. S. Inst. of India. Vol. XV., No. 68.

ITALY.

Revista di Artiglieria e Genio. (Roma.) Aug., Sept. and Oct., 1887.

SPAIN.

Memorial de Artilleria. (Madrid.) July, Aug., Sept. and Oct., 1887.

UNITED STATES.

Proceedings of the United States Naval Institute. Vol. XIII., No. 3.

1.—The Naval Brigade, its Organization, Equipment and Tactics. (Prize Essay.) (Lieut. Hutchins.)

2.—Training of Enlisted Men of the Engineers' Force.

Railroad and Engineering Journal. Aug., 1887.

Armored Battle-Ship, U. S. Navy.

Hydro-Pneumatic Disappearing Gun-Carriage.

[The same, Sept., Oct. and Nov., 1887.]

The Book Mart. Sept., Oct.

North American Review. Sept., 1887.

Sherman's March to the Sea.

[The same, Oct., 1887.]

The Battle of Petersburg. (Gen. Beauregard.)

[The same, Nov., 1887.]

The Battle of Petersburg. (Gen. Beauregard.)

The Century. Sept., 1887.

The Colored Troops at Petersburg.

Assault and Repulse at Fort Stedman.

[The same, Oct., 1887.]

Marching Through Georgia and the Carolinas.

Sherman's March from Savannah to Bentonville.

The Battle of Bentonville.

[The same, Nov., 1887.]

Grant's Last Campaign.

St. Nicholas. Sept., Oct. and Nov., 1887.

Johns Hopkins University Publications.

American Chemical Journal. Aug., Sept.

Studies from the Biological Laboratory.

American Journal of Philology. July, 1887.

The Predictions of Hamilton and De Tocqueville.

American Journal of Mathematics. Oct., 1887.

Pennsylvania Magazine of History and Biography. Oct.

Bulletin of the American Geographical Society. Vol. XIX., No. 8.

Scribner's Magazine. Sept., Oct., Nov.

The Forum. Sept., Oct., Nov.

Magazine of American History. Sept., 1887.

General James M. Varnum, of the Continental Army.

The United States and the Greek Revolution.

[The same, Oct., 1887.]

General Sterling Price. (New Mexico Insurrection, 1846-47.)

[The same, Nov., 1887.]

Department of Agriculture. Reports.

- 1.—Report on the Condition of Growing Crops and on the Freight Rates of Transportation Companies.
- 2.—The Icerya, or Fluted Scale, otherwise known as the Cottony Cushion-Scale.
- 3.—Reports of Observations and Experiments in the Practical Work in the Division of Entomology.
- 4.—Foods and Food Adulterants.
- 5.—Report on the Relations to Forest Supplies and Forestry.
- 6.—Report on the Condition of Crops, Yield of Grain per Acre, Labor and Prices in Mexico and Freight Rates of Transportation Companies.
- 7.—The Entomological Writings of Dr. A. S. Packard.

Science. No. 240 to 253.

Popular Science Monthly. Sept., Oct., Nov., 1887.

Harper's New Monthly Magazine. Sept., Oct., Nov. and Dec., 1887.

Grand Army Review. Oct., 1887.

The Hero of Bristoe.

[The same, Nov., 1887.]

The Martyr of Five Forks.

Outing. Sept., 1887.

Around the World on a Bicycle.

[The same, Oct., 1887.]

[The same, Nov., 1887.]

Ours. Sept., 1887.

The Army and the People, (Lieut. Hamilton.)

[The same, Oct., 1887.]

Army Life on the Frontier. (Lieut. Goldin.)

[The same, Nov., 1887.]

Saluting and Courtesy. (Lieut. Hamilton.)

Monthly Weather Review. June, July, Aug.

Political Science Quarterly. Sept.

Transactions of the American Society of Civil Engineers. July, 1887.

Army and Navy Register. (Washington.) To date.

Public Service Review. (New York.) To date.

